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CONTENTS

		Page
The Intelligence of School Children and Paternal Occupation	*J. E. Collins*	157
Vocabulary Burden	*Edward William Dolch*	170
The Construction and Validation of a French Grammar Test of the Selection or Multiple-Choice Type	*F. D. Cheydleur*	184
The Reading Process in Latin	*Wren Jones Grinstead*	197
An Experimental Study of Methods of Reviewing the Lesson of the Previous Day	*Oscar A. Ullrich*	211
Editorials		215
News and Communications		219
Reviews		224
Publications Received		229

JOURNAL OF EDUCATIONAL RESEARCH

Official Organ of the American Educational Research Association

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JOURNAL *of* EDUCATIONAL RESEARCH

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THE INTELLIGENCE OF SCHOOL CHILDREN AND PATERNAL OCCUPATION

J. E. COLLINS
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THE PRESENT study is an attempt to determine the degree of relationship existing between the intelligence of children and the occupational status of the father. The conclusions are based on data gathered from Grades I to VI of the public schools of an Ohio city of forty-five thousand population, in a survey directed by the writer in April, 1924, for the purpose of this and four related studies, as follows: (1) the relation of intelligence of children to their progress in school, (2) the relation of intelligence of children to size of family, (3) the relation of intelligence of children to the domestic status of parents, and (4) the relation of size of family to the occupational status of the father. In this investigation occasional reference will be made to these additional studies for the purpose of supplementation.

The total number of children enrolled in the six elementary grades at the time of the survey was 5,007. Of these 280 were omitted for lack of satisfactory data for the several studies. That these omissions do not materially affect the results of this investigation is assured, since the mean intelligence quotient of the 280 cases was practically normal, 98.9; and their occupational distribution was fairly representative of the total distribution. This study is therefore believed to be free from selection and to be representative of one type of American community, an industrial city.

The present investigation includes 4,727 children from 3,089 families. Extended studies show a total of 10,610 children, to date of the survey, in these 3,089 families, or an average of 3.43 children per family. One thousand and twenty-five of these were in the junior and senior high schools.

The first step in gathering the data was to establish an intelligence quotient for each of the 4,727 children. For this purpose, the Otis Primary Group Test was used in Grades I to IV, and the Otis Advanced Group Test in Grades V and VI. The results from the Stanford-Binet scale were available for 218 cases in the special schools. The data were then assembled in family groups and a sibling or "family" intelligence quotient was determined by computing the arithmetic mean of the intelligence quotients of the individuals in each family.

OCCUPATIONAL GROUPS

The teacher reported the occupation of the father of each child in her group. The parental occupation reported was checked against the report of the parents to the office of the superintendent of schools. For 423 children from 213 families the report of the father's occupation was either ambiguous or lacking; in most cases the father was deceased. These are classified as unknown in what follows.

Next, it was necessary to group the data according to occupational classes. This part of the study has been made with the cooperation of advanced and graduate students in education. A modified form of Taussig's well-known plan of non-competitive grouping was followed, but with special effort to derive a classification wherein the occupations within each group demand a similar level of intelligence.[1] With this in mind, the following classification was used:

Professional:

Lawyer, teacher, architect, civil engineer, editor, minister, dentist, physician, etc.

Managerial:

Factory manager, store manager, political office-holder, contractor, etc.

Clerical:

Accountant, clerk, stenographer, etc.

Trade:

Salesman, banker, broker, realtor, insurance agent, small-shop owner and operator, etc.

Foreman:

Factory foreman, yards foreman, etc.

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[1] Taussig, F. W. *Principles of Economics.* New York, Macmillan Company, 1922. Vol. II, pp. 141-144.

Skilled and semi-skilled labor:
Machinist, mechanic, metal worker, electrician, mason, carpenter, engineer, blacksmith, plumber, painter, printer, tailor, baker, chauffeur, truck driver, barber, policeman, brakeman, etc.

Unskilled labor:
Day-laborer, janitor, teamster, etc.

Agriculture:
Farm operator, farm hand, gardener, etc.

Unknown:
Data lacking, incomplete, or ambiguous

Four of these are non-labor groups and four are labor. This larger classification will be referred to later. The agricultural group gives the least satisfactory representation of one intelligence level, for here we find included men who would rate with the managerial group, with the foreman group, with the groups of skilled and unskilled labor. This difficulty, however, becomes negligible when it is noted that of the 3,089 families only twenty-five, or .81 percent, are thus classified.

Since this is an attempt to group occupations into levels of intelligence requirements, let us find to what extent this classification is justified by the Barr scale of occupational intelligence.[2] Mr. F. E. Barr chose thirty judges to rate one hundred representative occupations from 0 to 100 according to the grade of intelligence each requires. The probable-error values were computed from the distributions of these ratings and may be considered as representing the number of units of intelligence required for the given occupation. We have computed the mean probable-error value of the occupations falling under each non-labor group in this study. They are: professional, 14.85; managerial, 13.31; clerical, 12.26; and trade, 10.65. Thus comparison with the Barr ratings appears to justify the classification here used.

The normal character of the school population of our study is shown by the intelligence-quotient distributions of the 4,727 children and of the 3,089 families, as set forth in Table I. The means are slightly above the norm, the individual mean being 102.99, the family mean 104.70. The modal group, the intelligence-quo-

[2] See Terman, L. M. *Genetic Studies of Genius*. Stanford University, California, Stanford University Press, 1925. p. 66.

tient class 100-104, comprises 597 cases. There is a tendency for the two groups above to exceed the two groups below the mode. Aside from this slight upward tendency in the neighborhood of the mean, the distribution is fairly normal.

TABLE I

DISTRIBUTION OF INDIVIDUAL AND FAMILY INTELLIGENCE QUOTIENTS

Intelligence-Quotient Interval	Frequency (Individual)	Frequency (Family)
(1)	(2)	(3)
160–164	5	2
155–159	5	4
150–154	13	9
145–149	21	16
140–144	54	26
135–139	92	59
130–134	134	84
125–129	227	148
120–124	313	228
115–119	441	303
110–114	490	366
105–109	489	371
100–104	597	365
95– 99	448	295
90– 94	379	264
85– 89	281	173
80– 84	233	119
75– 79	135	81
70– 74	105	62
65– 69	82	35
60– 64	77	36
55– 59	48	19
50– 54	33	17
45– 49	11	2
40– 44	6	1
35– 39	2	0
30– 34	5	4
25– 29	1	0
Mean	102.99	104.70

The distributions of the individual and family intelligence quotients are graphically shown in Figure 1. The wider spread of the curves in the lower intelligence quotients is explained by the

finer discriminations obtained by the use of the Stanford-Binet test used for the pupils of the special schools.

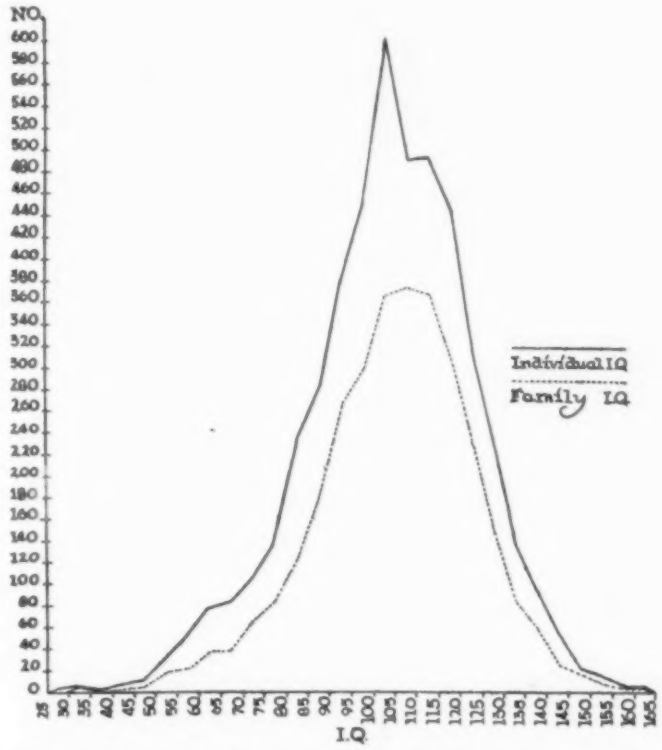

Figure 1. Curves of distribution of 4,727 school children and their 3,089 families on the bases of individual and mean sibling or family intelligence quotients

Table II shows the number of families in each occupational group and the central tendencies with respect to intelligence quotients. Because of the industrial character of the community, it is to be expected that the skilled-labor group will overbalance the others. The table shows that 50.79 percent of the families fall in this group. This likewise accounts for the fact that the managerial group is larger than the professional. The occupational distribution of these 3,089 school families shows general agreement with

the distribution of workers of the city as a whole, as reported in the last federal census.

TABLE II

COMBINED OCCUPATIONAL GROUPS

Group	Number of Families	Percent of Total	Mean Family Intelligence Quotient	Mean Individual Intelligence Quotient	Family Inter-Quartile Range	Median Family Intelligence Quotient
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Professional	90	2.91	115.92	114.53	108–126	116
Managerial	165	5.34	113.24	112.68	104–123	112
Clerical	131	4.24	113.17	112.06	105–122	113
Trade	413	13.37	110.47	108.96	100–120	110
Foreman	106	3.43	107.30	106.23	98–118	109
Skilled labor	1,569	50.79	102.63	102.13	94–114	104
Unskilled labor	377	12.21	95.19	94.36	85–108	95
Agricultural	25	.81	99.58	99.54	87–112	98
Unknown	213	6.90	99.00	96.34	88–112	100
Total	3,089	100.00	104.09	102.99	94–116	105

In general, the four measures of central tendency are consistent and grade downward from the professional group to the unskilled-labor group. It will be observed that the mean family intelligence quotient for all occupations is higher than the mean individual intelligence quotient. The fact that the larger families in all groups occur at the lower intelligence levels accounts for this.

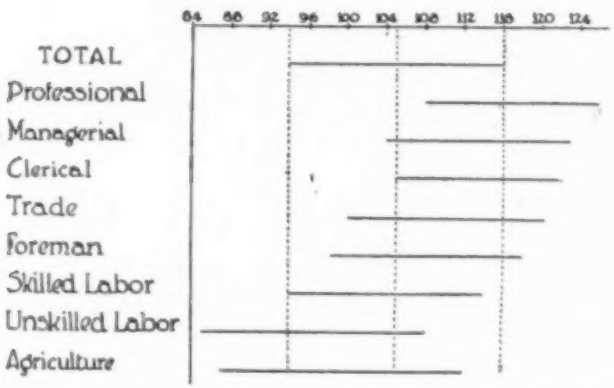

Figure 2. The interquartile ranges by occupational groups for 3,089 school families based on mean sibling or family intelligence quotients

INTERQUARTILE RANGE OF GROUP DISTRIBUTIONS

An examination of Figure 2 will give a clear idea of the distribution of family intelligence quotients in each group and how this distribution compares with that of the total group. The figure is based on Column 6 of Table II. It may be read: the middle fifty percent of the families in the professional group have intelligence quotients from 108 to 126 . . . etc.

Intelligence quotients of the middle fifty percent of the total group range from 94 to 116, with the median at 105. The medians for the first five groups lie above this general median, the median for the professional group falling at the third-quartile point of the total group. The median for the unskilled-labor group is but one point above the first quartile of the total group. The middle fifty percent of the professional and clerical groups falls entirely to the right of the general median, while that of the managerial group reaches but one point below it.

Such marked concentration does not appear in the distribution of the labor groups. The professional group has an interquartile range of but eighteen points; that of the unskilled-labor group

TABLE III

DISTRIBUTION OF INTELLIGENCE QUOTIENTS WITHIN THE FAMILIES OF PROFESSIONAL MEN AND UNSKILLED LABORERS

Intelligence Quotient Interval	Professional			Unskilled Labor		
	Number of Families	Percent	Accumulated Percent	Number of Families	Percent	Accumulated Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
150–159	1	1.1	100	.....	.....	100
140–149	5	5.6	98.9	.....	.....	100
130–139	9	10.0	93.3	9	2.4	100
120–129	24	26.7	83.3	21	5.6	97.6
110–119	24	26.7	56.6	58	15.4	92.0
100–109	18	20.0	29.9	74	19.6	76.6
90– 99	4	4.4	9.9	80	21.2	57.0
80– 89	3	3.3	5.5	69	18.3	35.8
70– 79	1	1.1	2.2	28	7.4	17.5
60– 69	.....	.....	1.1	25	6.6	10.1
50– 59	1	1.1	1.1	12	3.2	3.5
40– 49	.....	.....	.....	1	.3	.3

spreads over twenty-three points. So we find the medians for skilled labor, unskilled labor, and agriculture falling between the first- and second-quartile points of the total group.

PROFESSIONAL AND UNSKILLED LABOR GROUPS

A still more striking and significant difference is brought out in Figure 3 based on Table III where percentile curves of distribution are drawn for the professional and unskilled-labor groups. Figure 3 may be read: 1.1 percent of the families in the professional group, and 10.1 percent of the families in the unskilled-

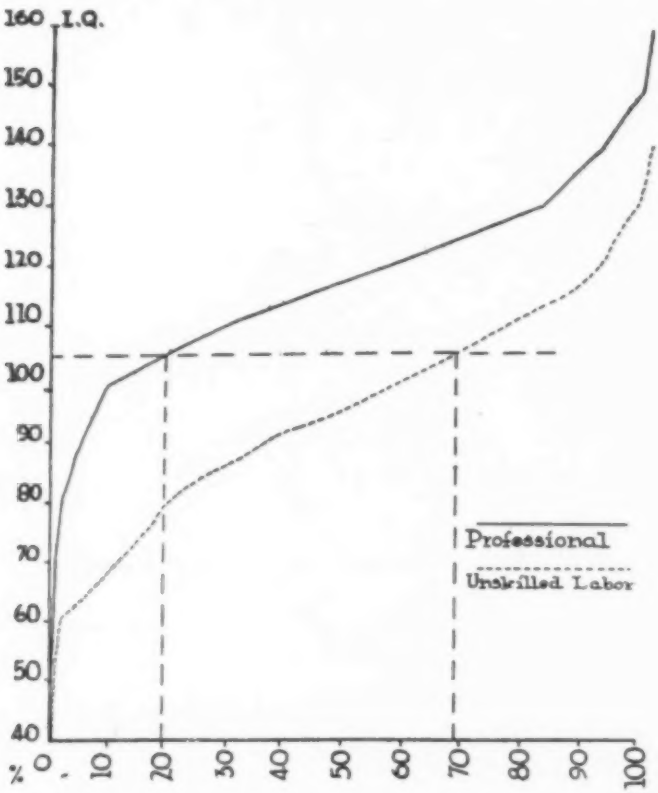

Figure 3. Percentile curves are shown here for professional and unskilled labor groups based on mean sibling or family intelligence quotients

labor group have intelligence quotients of less than 70 . . . . etc. Now, if we follow the median line (105) across the chart, we find by interpolation that 20 percent of the professional group as compared with 69 percent of the unskilled-labor group falls below the median.

This concentration of children of professional fathers at the higher ranges of intelligence, and of the children of unskilled fathers at the lower levels is further illustrated in the following: (1) Our data show that six of the 90 professional families have mean sibling or family *IQ's* of 140 or more, while none of the 377 families of unskilled fathers are found at this level. Seventy-two of the professional families, or 80 percent, are found above the median of our total group of 3,089 families, while but 31 percent of the unskilled group are above the median. (2) Just the opposite is found at the lower ranges of intelligence. We find but one of the 90 professional families, or 1.1 percent, with a family intelligence quotient of less than 70, while thirty-eight of the 377 unskilled families, or 10.1 percent appear at this level. This professional family, that of an itinerant non-resident preacher, is at 53 based on three children (with guardians) with *IQ's* of 43, 55 and 61 (Stanford-Binet). As previously noted the Stanford-Binet test had been uniformly used at these lower levels of intelligence for several years as partial basis for assignment to the special schools.

Data derived from a study of the 38 families of the unskilled class at this level are of special significance. We find that seventeen of these families have each more than one child in school whose intelligence quotient is less than 70. The record is held by a family with eight children, five of whom are in school and all below this level of intelligence, giving a mean or family *IQ* of 48. Two families have three children each, and fourteen have two each in school with intelligence quotients of less than 70. Further study shows a total of 138 children—to the date of the survey—in these seventeen families, which is an average of 8.1 children per family. Of the 138 children, 48 are in school. Thirty-nine of these have intelligence ratings of less than 70 and are either in the special schools or on the waiting list. One of these cases, of illegitimate birth, left school on her sixteenth birthday to be married at the

request of her mother; another, from a family of eleven children, an epileptic and a juvenile delinquent at the time because of illicit relations, has since married and has one child. The records of three of these families show seven older siblings who previously had been in the special schools.

Further study of the data shows a total of 109 children in the schools with intelligence quotients of less than 70 from 80 of the 377 unskilled families, while, as already noted, only three cases from the one family appear in the professional group. Thus from the unskilled families, 12.21 percent of the total, come approximately half of our entire enrollment in the special schools for mentally defective and problem children. This number seems large but is in agreement with the findings of Dr. H. H. Goddard and Dr. Florence Mateer who in 1919 cooperated in a survey of the same system for the segregation of feeble-minded persons and the potentially feeble-minded.

During this five year period from 1919 to 1924, children of low intelligence and other problem cases found in the regular schools were tested annually by the Stanford-Binet method. There was no effort to restrict attendance, especially since the institutional cases were denied admission to the state institutions because of overcrowded conditions. The special schools as a separate unit of school organization became popular, therefore, both with the parents of these unfortunate children and with the teachers in the regular grades. Such conditions facilitated a complete survey at this level and also gave opportunity for the study of achievement and other problems at the two extreme ranges of intelligence.

The average number of children per family in the professional group, to the date of the survey, is 2.62; in the unskilled group, 4.13. Thus we find the size of the family increasing with decreasing intelligence both from group to group and by families within each group. This situation accounts in part, we believe, for the large number of cases found in the elementary schools whose intelligence quotients are less than 70. Then, there is a general concentration downward through retardation of inferior cases, while the concentration is upward for gifted children through acceleration toward the high school. In fact, but five children with intelligence quotients of less than 70 are found above the elementary

grades. These were all failing and withdrew by the close of the year or upon reaching the age limit of compulsory attendance.

Figure 4 gives graphic illustration of the distribution of the 90 professional and 377 unskilled-labor families on the basis of mean sibling or family intelligence quotient. This chart shows the median for each group as compared with the general median of 105 for the total group of 3,089 families. As previously noted the family medians and means for all occupational groups and for the total are above the corresponding central tendencies for individual cases within the group because of the larger families at the lower intelligence levels.

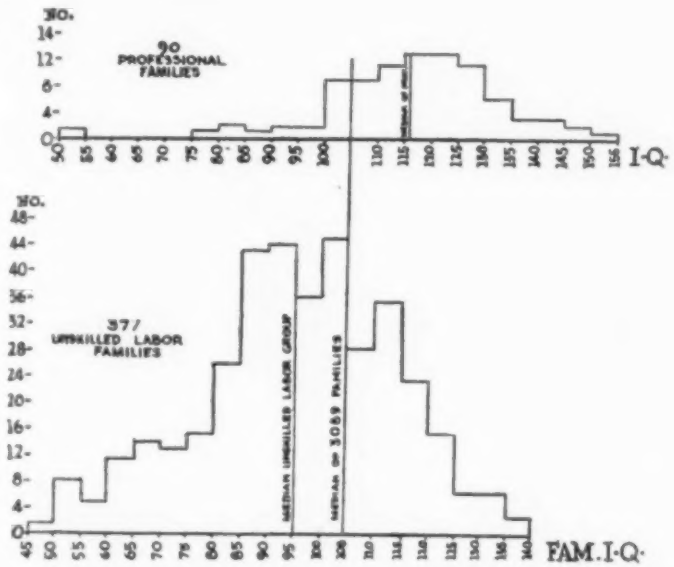

Figure 4. Distribution of professional and unskilled labor families on the basis of mean sibling or family intelligence quotients

LABOR AND NON-LABOR GROUPS

Of the total number of families, 25.9 percent are non-labor, 67.2 are labor, and the remaining 6.9 percent are unknown (see Table II, Column 3). Further evidence of the correlation between the paternal occupation and the intelligence of children is shown by the proportion of labor and non-labor families in each

decile of the intelligence quotient array. From Figure 5 we learn that in the first decile less than one-tenth of the families have non-labor occupations; in the tenth decile nearly one-half of the families have non-labor occupations. Compare these deviations with the percent of non-labor occupations for the whole group. Between these two extremes the percent of non-labor families increases consistently with the intelligence quotient. The unknown cases are designated by x in the chart.

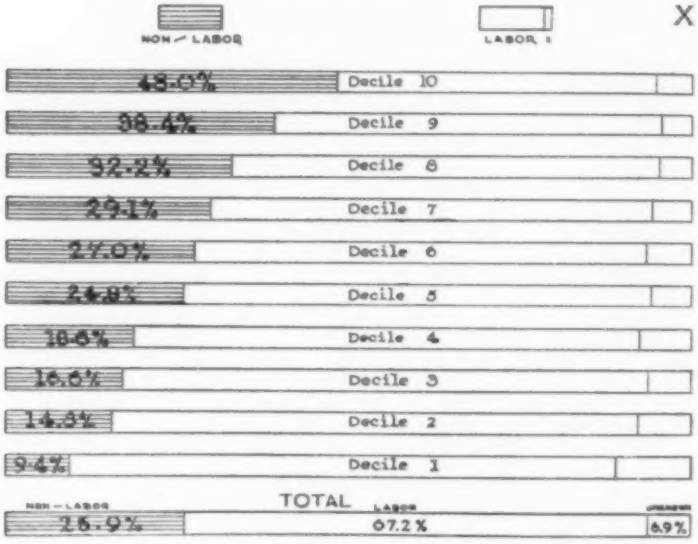

Figure 5. Distribution of non-labor, labor, and unknown families by deciles on the basis of mean sibling or family intelligence quotients

This analysis of the elementary-school population of one city shows the mean intelligence quotient to be 102.99 with the distribution normal about this mean. A summary of the occupations of the fathers of these children shows the population to be largely industrial. The children of professional and managerial fathers have a higher intelligence quotient, on the average, than those of clerical or trade fathers, who in turn have a higher intelligence rating than the children of laboring fathers. The middle fifty percent of the family intelligence quotients of the professional, managerial, and clerical groups lie almost entirely above the gen-

eral mean; the unskilled labor and agricultural groups lie almost entirely below the general mean. One-fifth of the family intelligence quotients of the professional group and two-thirds of those of the unskilled labor group are less than the mean.

The occupation of the father, then, may be considered as a rough index to the intelligence of the child. The chances are that half of the children of professional parents will be of superior intelligence and that not more than one-tenth of the children of unskilled laborers will show a similar degree of intelligence. It will be understood that this study does not presume to suggest to what extent the tests used measure native capacity or achievement. Related studies covering a three-year period preceding the present survey showed, however, for the same city a very definite correlation between the results of these tests and school achievement.

The army examinations showed a marked tendency downward in test scores for adults arrayed in occupational groups, from professional to unskilled labor, while the findings of the present study are in agreement with those of Haggerty and Nash, Terman, Pressey, and others, that a corresponding relationship exists between the intelligence of children and the occupational status of the father. It would seem, therefore, that such a direct relationship exists between the probable school success of the child and the occupational status of the family as to make the latter a definite factor in the development of adequate educational and guidance programs.

VOCABULARY BURDEN

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University of Illinois

FOR school children to get what they ought from the reading books provided them, there should at all times be interest, understanding, and ease of reading. Vocabulary burden or difficulty is usually considered part of the last of these elements, and therefore a matter of less importance. Yet reading is a unified process, and each element in it is dependent upon every other. Interest may be so great as to overcome meager understanding or vocabulary difficulty. Conversely, vocabulary difficulty may cripple understanding and destroy interest.

PERCENT OF DIFFERENT WORDS

A simple and rather rough-and-ready way of measuring the vocabulary burden of a textbook is to count the total running words, then list the vocabulary or different words and divide the first by the second. This gives a percent which expresses the ratio between the different words and the running words. This percent is some measure of the vocabulary difficulty, because it may be assumed that a book with a greater percent of different words must include a greater range of vocabulary, and that its vocabulary is, therefore, quite certain to extend further from the familiar region of everyday language and to include the less familiar, and therefore harder, groups of literary or technical words. On another score, this method may indicate degree of difficulty. The book with the smaller percent of different words must have a greater amount of repetition, and repetition tends to make the reading-matter easier.

OBJECTIONS TO SAMPLING

At this point we must register an objection to the method which has been employed of sampling textbooks to compare them with one another with respect to vocabulary burden. Aside from the usual possibility of error in sampling, there are large and unavoidable errors in such sampling. Textbooks are not and cannot be homogeneous. They must include a series of stories, or articles or topics which differ a great deal from one another. Therefore, no

section of the book can fairly represent all sections. To overcome this difficulty the method of sampling selects lines at regular intervals throughout. This runs into even greater inaccuracy. The sample is then not a piece of reading-matter at all but a succession of disconnected bits. It fails to represent the text, because it cannot possibly show the factor of repetition of words. No matter how careful an author was to repeat his statements, it would make no difference in such a sampling because a single line on a page does not show what precedes or follows it, and another line five pages on or even on the next page will almost certainly contain different material. Occasional whole pages might form a better sample but still not a representative one, and for the same reason. In fact, the conditions of language and style in writing are such that no study of pieces can truly represent the whole.

To see whether the measure would prove a significant indication of the difficulty of school readers, the percent of different words was found for books of a number of series as shown in Table I. The outstanding point of this table is the great variation,

TABLE I

PERCENT OF DIFFERENT WORDS IN SCHOOL READERS*

	A	B	C	D	E	F	G
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Primer	6.7	7.5	.....	4.3	4.8	8.4	8.3
Grade I	7.9	6.7	8.0	4.8	7.4	9.8	10.4
Grade II	8.3	6.9	10.1	.....	.....	.....	.....
Grade III	5.4	4.2	7.1	Later books in these series were not tabulated			
Grade IV	5.5	4.9	6.2				

*The base in each case is the total running words of the book less proper names. Words were recorded on a dictionary basis, namely, by combining inflectional forms.

especially between books intended for the same grade. The primers range from 4.3 percent to 8.3 percent. In Grades I and II there is a range in each case from 4.8 percent to more than 10 percent. Each of these series was issued rather recently and is widely used.

From a study of the books themselves, one can discover part of the reason for this variation in the early reading books. The primers which show small percents use two devices to get repeti-

tion. One is to expand the different stories so that there is a good deal of text about each incident or set of characters. Another device is to use the same characters or material in successive selections. Those readers which show a high percent of different words use many different short selections so that large numbers of new words are constantly being added but are not used very often.

The low percents for Books III and IV of the first two series are explained in a somewhat similar manner. These are literary readers with selections of considerable length. Consequently, each selection uses its own words repeatedly; and there is likewise a repetition of many words which are common to that general type of material. Series C, on the other hand, contains informational matter on contemporary life so that a wide range of vocabulary is necessarily included.

How can one use this table to compare these series with one another as to difficulty? It will be seen that in every grade there is at least one book with less than 5 percent of different words. Either these books are too easy, or those with higher percents are too hard, or the proper proportion lies between them. Since all the complaint against school readers has been because of their too great difficulty, we are inclined to believe that these easier readers have something in their favor. From this line of reasoning, we should think that the readers having a high percent of difficult words would be improved either by a cutting down of vocabulary or by an amplification of their text to secure more repetition of the words they now use.

The method just described, though quite significant in comparing books for the same grade, fails to operate, as can be seen from the table, when the comparison is made between grades. From the figures shown, it would seem that some of the upper-grade books are easier than the lower-grade ones. This would really be the case if repetition were the only factor, but the upper-grade books actually have much larger vocabularies and contain many more difficult words. We must, therefore, seek a method of measuring amount of word difficulty.

PERCENT OF DIFFICULT WORDS

Two books of the same size may have vocabularies about equal in extent, and yet the words in one may be more difficult for the

children than the words in the other. The problem is to measure this difficulty. Formerly, experienced teachers inspected the vocabulary of a book to see whether or not the words were too hard for a certain grade, but recently Thorndike's *Word Book* has been used for this purpose. Lively and Pressey looked up the vocabulary of textbooks on Thorndike's *Word List* and recorded for each word the frequency credit Thorndike had found for it in his tabulation.[1] They then compared textbooks as to difficulty by comparing the median frequency credit of one vocabulary with the median frequency credit of another. This is a very convenient method; but it is subject, as these authors point out, to any objections one may have to the ratings given by Thorndike. The two common exceptions taken to Thorndike's work are that classic literature for adults formed far too great a part of his sources, and that the *Word Book* assumes that frequency and difficulty correlate very closely. There is the further fact that there is no established relation between Thorndike's frequency levels and school grades.

Fortunately, we now have a much more defensible basis for measuring the difficulty of words in the Combined Word Study List[2] which gives us all the data now available as to words actually used by children of different grades in school. We can now look up in this list the vocabulary of any school textbook, and we may thus find out what words belong to each of the school grades. Of course the list is not final, but it is based upon so large an amount of data as to justify considerable dependence upon its conclusions. A good many words in some textbooks will not be found upon the list at all; but in such a case we are justified in assuming that such words are at least not within the usual knowledge of eighth-grade children, though in an occasional instance the fact may be that

[1] Lively, Bertha, and Pressey, S. L. "A Method of Measuring the Vocabulary Burden of Textbooks," *Educational Administration and Supervision*, 9: 389-98, October, 1923. The method is also used by C. O. Mathews, *Grade Placement of Curriculum Materials in the Social Studies* (Teachers College, Columbia University, Contributions to Education, No. 241).

[2] Dolch, E. W. "The Combined Word Study List," *Journal of Educational Research*, 17: 11-19, January, 1927.

the word does belong in a grade vocabulary but has been missed by the various tabulators.

In using this list to test the difficulty of a textbook, it seems most reasonable to consider as easy words only those which the list assigns to lower grades than the one for which the text is intended. The words which the list assigns to the same grade are more probably those learned *during* that year, and therefore they cannot be assumed as known at the beginning of the year. We have thus assumed that words first appearing in the second year were learned during that year, that those first appearing in the third year were learned during the third year, and so on. It is true that a vocabulary that would be hard for third-grade children in September would not be so hard for them in April; but a line has to be drawn somewhere, so we are here considering the vocabulary difficulty that these books would have at the beginning of the year. In considering the figures, one must make allowance for a decrease in difficulty later in the term.

Using this method we have measured the vocabulary difficulty of some of the readers shown in Table I. We have not considered first readers, because presumably the chief difficulty here is recognition of words and this will depend upon the primer and pre-primer teaching. The upper portion of Table II therefore shows for the remaining readers the percent of the different words which are not surely known at the beginning of the particular school year. For the purposes of this study difficult words are all those not assigned to the lower grades by the Combined Word Study List.

The percent given in the tables may seem very high, but it must be remembered that they include the words of the year for which the reader is intended. Likewise, school readers are intended to teach new words; and we therefore expect them to contain a great many. If we were dealing with supplementary reading books to be merely read and not studied, we should expect much lower percents. The problem of supplementary reading will be considered later.

In comparing the series we find that by this method, as by the percent of different words, Series B is easier than Series A. But Series C, shown on Table I as having the heaviest vocabulary bur-

den, is here shown as having the smallest percent of difficult words. Which table gives the true relationship? This situation points out the inadequacy of the figures given in the upper portion of Table II taken by themselves. These percents are based upon the number of different words in the readers. But two readers might have the same size and difficulty of vocabulary while one of them had 50 percent more running words. In that case, the larger book would clearly be less difficult. For this reason we must consider the difficult words in a reader in relation to the total running words. By combining the figures given in the upper portion of Table II and the corresponding numbers in Table I, we can get the ratio of difficult words to running words; and we have shown this in the lower part of the second table.

TABLE II

PERCENT OF DIFFICULT WORDS IN SCHOOL READERS

	Series of Readers[a]		
	A	B	C
(1)	(2)	(3)	(4)
	Percent of Difficult Words[b]		
Grade II.....	31	23	21
Grade III....	33	24	17
Grade IV....	40	36	20
	Ratio of Difficult Words to Running Words		
Grade II.....	2.5	1.5	2.1
Grade III....	1.7	1.0	1.2
Grade IV....	2.2	1.7	1.2

[a]The three series are the same as the first three in Table I.
[b]The base in each case is the total number of different words in the reader.

The figures thus secured are considerably different from those in the upper part of Table II. Within Series A and B we no longer find the marked increase in difficulty for the latter books, simply because these books are larger in size; and the difficult words, though greater in absolute number, are more scattered out through the text. We also find Series C changing its relative position. Its percents of difficult words were low, but its relative numbers of different words were high; consequently Table II

shows that in these books difficult words might be met with just as often as in the other series. Thus, it is clearly evident that by relating the number of difficult words to the number of running words we get a truer description of the situation.

DEGREES OF DIFFICULTY

It will probably have been evident that up to this point we have dealt with difficult words as though they were all equally hard for a child to understand. Our percents have lumped them all together, yet some of these words may be one grade beyond the pupil; and others may be such as can be understood only by mature adults. Therefore the methods so far used, though of distinct practical value, are still not satisfactory as showing the true situation. Instead we want to know how difficult the difficult words in a reader are. As already mentioned, the Combined Word Study List gives the grade-placement of all the words found by

TABLE III

DEGREES OF DIFFICULTY IN WORDS

	For Lower Grades	For Grade Assigned	For Higher Grades							Words Used by Adults
			II	III	IV	V	VI	VII	VIII	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Series A										
Grade I	.....	83	9	3	2	.4	.1	.....	.1	2
Grade II	69	14	.....	7	3	1	.9	.3	.2	4
Grade III	67	10	.....	.....	6	2	3	2	.6	10
Grade IV	60	10	.....	.....	.....	2	4	3	2	19
Series B										
Grade I	.....	85	8	3	2	.6	.1	.....	.....	2
Grade II	77	12	.....	4	2	.4	.3	.1	.....	4
Grade III	76	9	.....	.....	4	.8	1	.8	.2	8
Grade IV	64	9	.....	.....	.....	2	3	3	1	17
Series C:										
Grade I	.....	92	2	1	.8	.6	.2	.2	.....	2
Grade II	79	11	.....	5	2	.7	.3	.1	.....	2
Grade III	83	7	.....	.....	4	1	.3	.2	.1	4
Grade IV	80	7	.....	.....	.....	3	1	.9	.2	8

NOTE—Distribution by percent of the total different words in the readers according to grades assigned by the Combined Word Study List. Percents given in nearest whole number except when less than 1.

scientific studies to be used by children. It also gives the words most commonly used by adults, principally some of those found by Thorndike and Horn which were not used by children. Words in school readers that do not appear on any of these sources—and there are a few—may surely be considered as words used by adults. Proper names are nowhere dealt with, because they represent an entirely independent set of problems.

The vocabulary of a textbook can be easily looked up in the Combined Word Study List, and the results tabulated. We have done this for the three series already discussed, and we show in Table III how these vocabularies are distributed through the various grades. The percents for lower grades, for the grade the reader is planned for, for each of the higher grades, and the percent of adults' words are shown in each case.

With this table we are clearly getting a more accurate view of the situation. Within each series there is a great similarity between the books (except Book I) as to percent of lower-grade words and percent of words for the grade itself. That is, each author's subjective adjustment of his material to his readers remained about the same throughout his series in this respect, but the standards of the various authors evidently differed. In fact, it is very interesting that Series A, B, and C should differ so consistently with regard to lower-grade and grade words.

Considering the central part of the table, it will be seen that the percent of words one grade higher than the reader decreases steadily from the second to the fourth, and the upper readers tend to have higher percents of words that are several grades beyond the one assigned. But the most marked and interesting tendency is shown in the column marked "Words Used by Adults." Here there is a distinct progression from grade to grade and also a distinct difference between the series. These adults' words are undoubtedly hard, and a book such as Series A for Grade IV, which has nearly 20 percent of them, must be difficult. This book in fact contains such selections as the "King of the Golden River" and some from the *Arabian Nights*. These selections are adapted but still have a literary vocabulary.

By this method of comparison, Series B is still easier than Series A in every grade. By it also Series C appears the easiest

of them all, chiefly because of the high percent of lower-grade words and the low percent of words used by adults. This series, as already explained, contains informational material about the life and things with which children are surrounded. There is none of the "book vocabulary" of classic literature. The adults' words are likely to be technical instead. Yet here again, as in Table II, Series C has a more favorable showing than perhaps it should because the factor of repetition is omitted. Table I showed that Series C had the highest percent of vocabulary burden measured by the ratio of different words to running words. We should therefore test in some way the relation of Table III to the repetition in the readers.

The amount of repetition is especially important because of the weight of adults' words carried by some of the books. Adults' words need to be taught at some time, and they *can* be taught if they are used repeatedly in children's reading-matter. They would be hard the first time met with but would be easier with each repetition. Are these hard words actually repeated in the readers?

REPETITION OF DIFFICULT WORDS

To see what repetition these series of readers gave to the difficult words for various grades, we have prepared Table IV. This deals with the same groups of words as Table III except those for grades lower than the one for which the book is intended. For each grade it shows the median frequency so that in each group there are as many words with a lower frequency as with a higher frequency. When the median frequency is 1, this means that more than half the group of words are used once only.

This table shows the median instead of the average frequency, because the real facts are thus more truly represented. That is, the median shows the actual repetition given the great bulk of these difficult words. A very few of these higher-grade words are used quite often just because the things or ideas they refer to were necessarily dealt with again and again in some selection. These high-frequency words are so few as to make little difference in the teaching of difficult words, but their high frequencies would raise the arithmetical average in a few of the groups so as to misrepresent the real situation.

Table IV answers very definitely the question as to whether these readers give repetition to difficult words. Very evidently they do not. In the majority of cases more than half of the words in these groups are used once only. Whenever the median frequency is 2, this figure usually indicates that nearly half the words in the group were used once only but that the center of the distribution fell in the 2 group. In just a few cases the median came in the 3 group.

On this table also, Series B is somewhat better than Series A. In fact, though the difference in figures may seem slight, even a

TABLE IV

MEDIAN FREQUENCY OF DIFFICULT WORDS

	For Grade Assigned	For Higher Grades							Words Used by Adults
		II	III	IV	V	VI	VII	VIII	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Series A:									
Grade I	2	1	2	1	1	XX*	.....	XX	2
Grade II	2	2	2	1	1	2	1	1	1
Grade III	2	.....	2	2	1	1	1	1	1
Grade IV	2	.....	.....	2	1	1	1	1	1
Series B:									
Grade I	5	3	3	2	3	1	.....	.....	2
Grade II	2	2	1	1	1	1	XX	.....	1
Grade III	1	.....	1	2	2	1	1	1	1
Grade IV	2	.....	.....	2	2	2	2	2	2
Series C:									
Grade I	2	3	3	1	2	XX	XX	.....	2
Grade II	1	1	1	1	1	1	XX	.....	1
Grade III	2	.....	2	2	2	2	1	XX	2
Grade IV	2	.....	.....	2	1	1	1	2	1

*XX means only one word of high frequency so that no median figure can be used.

slight increase in repetition of difficult words will make a big difference to the pupil and teacher. On this table, Series C again shifts position. Though, as we have previously seen, it has a smaller percent of difficult words than the other readers, it is apparent that it does not repeat the hard words any more than they do. In fact, it is slightly inferior in repetition to Series B.

We believe it is necessary to get figures on repetition of difficult words before one can fully understand the word situation in

any reader. Yet in the case of these books these figures do not enable us to make much of a comparison. We are, therefore, compelled to turn back to Table II and Table III in order to form a judgment. The one table tells us the relation between the difficult words and the size of the book; the other tells us how difficult the words are.

In the case of some series, we might find a valuable basis for comparison by certain of these methods; and, in the case of others, other methods might prove more fruitful. In short, before we are justified in saying that one textbook is more or less difficult than another we are in duty bound to discover and present all of these facts, and from all of them to discover the qualities of the different books so far as word analysis can reveal them.

SUPPLEMENTARY READING

Up to this point we have considered the difficulty of readers in the grade for which they are designed, but the school is also much interested in the difficulty of supplementary reading books. Such books are assumed to be read by the children largely without help and considerably on their own initiative. Consequently, supplementary reading books must be easy enough for the children to go through them quite rapidly without much puzzling over words.

Some experiments have shown that children, when permitted to choose, select books for free reading that are usually studied two or three grades lower down. Since many might consider this an excessive difference, let us here assume that a supplementary reading book should be at least one grade less difficult than the assigned reader. What then would our figures tell us about supplementary reading?

Since the percent of different words as shown on Table I is really an index of repetition, we can at least believe that a supplementary reading book for any grade should not have less repetition than the reader for that grade. If we select the best figures from all parts of the table, we find that in each of the grades shown there is at least one book with as low as 4.8 percent of different words. It would not seem unreasonable to set this as an optimum figure for supplementary reading books.

In the case of word difficulty, the situation is quite different, because with each succeeding grade the pupil's language equipment increases, and therefore more of the words in the book are already familiar. We can derive some standard from Table III, which gives the distribution of the words in these readers as to difficulty. If we are to assume that supplementary reading should be one grade easier than the reading text, we can assume that these books might be used as supplementary reading one grade further up than now planned for. Then on Table III we need only add the column for lower grades and for the grade assigned, and shift over the first figure under higher grades. The result is Table V.

TABLE V

DEGREE OF DIFFICULTY FOR SUPPLEMENTARY READING

	For Lower Grades	For Grade Assigned	For Higher Grades						Words Used by Adults
			III	IV	V	VI	VII	VIII	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Series A:									
Grade II	83	9	3	2	.4	.1	.....	.1	2
Grade III	83	7	.....	3	1	.9	.3	.2	4
Grade IV	77	6	.....	.....	2	3	2	.6	10
Grade V	70	2	.....	.....	.....	4	3	2	19
Series B:									
Grade II	85	8	3	2	.6	.1	.....	.....	2
Grade III	89	4	.....	2	.4	.3	.1	.....	4
Grade IV	85	4	.....	.....	.8	1	.8	.2	8
Grade V	73	2	.....	.....	.....	3	3	1	17
Series C:									
Grade II	92	2	1	.8	.6	.2	.2	.....	2
Grade III	90	5	.....	2	.7	.3	.1	.....	2
Grade IV	90	4	.....	.....	1	.3	.2	.1	4
Grade V	87	3	.....	.....	.....	1	.9	.2	8

NOTE—These books are the same as those on Table III, but their percent of difficult words are here shown as they would be if the books were used one grade higher than they are now studied. Percents are given in nearest whole number except when less than 1.

From this situation, of school readers used one grade higher than intended, we get an interesting suggestion as to the difficulty of supplementary reading books. The figures for these books differ considerably, but we may draw some sort of judgment from them. Let us arbitrarily average the percents for lower grades. The result

is about 84 percent, and it quite fairly represents the proportion in most of the cases. Averaging the percents for the grade assigned we get almost exactly 5 percent, which is also quite representative.

We may then say that, on the premises stated, a supplementary reading book should have about 84 percent of its words for lower grades and about 5 percent for the grade assigned. For the remaining 10 percent we cannot use the method of averaging as the conditions are too diversified. But omitting the extreme cases, we may reasonably say that the other results point to a proportion of from 2 to 5 percent adults' words, the balance being for higher grades. Such a book would accord with most of the figures on Table V except for the high percent of adults' words. In some types of supplementary reading there must inevitably be a great many adult words, but in such a case we would certainly have a right to demand that they be repeated often or be especially taught, and not used once only as are so many of the hard words in these reading books.

An analysis of supplementary readers to secure all of this information will naturally require some tabulation, but it should certainly be undertaken as an essential factor in the placement of any book. The figures we have suggested are naturally subject to much revision from further tabulations of this kind and perhaps from other methods of attack. They do represent, nevertheless, a decided advance over the purely subjective methods which have heretofore of necessity been used.

SUMMARY

The vocabulary burden of a textbook has an important bearing both upon interest and understanding. It should therefore be measured and expressed. Various possible ways of doing so have been tried out on certain school readers and are here presented. First, the total of running words in a book may be divided by the total number of different words, giving a percent which indicates roughly the vocabulary burden. This method does not distinguish between relative difficulty of different words. Second, we may determine by checking the vocabulary against some list such as the Combined Word Study List what percent is probably unknown to children at the beginning of the school year in which the book is

used. This gives relative difficulty of vocabulary, but it takes no account of differences in repetition, which may affect considerably the difficulty of the text itself. Third, a truer result is therefore secured if the group of difficult words is compared to the total running words. Fourth, there are still degrees of difficulty among the difficult words; some are one grade too hard and others, many grades. Therefore a table distributing the different words in the book into the grades in which they belong will show a more accurate picture. Fifth, this method also ignores repetition. Therefore, we may likewise show the median frequency for each group of difficult words.

If textbooks are to be praised or condemned with regard to vocabulary difficulty we should, in fairness to all concerned, present the full and complete facts regarding the situation in some of the ways here described. If a book is intended for supplementary reading, we may use the same methods, but we should make allowance for the fact that such reading should be a grade or two easier than ordinary texts. We have shown the effect of such an allowance on the figures for the books here used as illustrations. This analysis of possibilities should help in further application of objective methods to the important problem of textbook difficulty.

THE CONSTRUCTION AND VALIDATION OF A FRENCH GRAMMAR TEST OF THE SELECTION OR MULTIPLE-CHOICE TYPE

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THE PERSONS engaged in the Modern Foreign-Language Study just completed were at the outset confronted with the necessity of constructing a series of standardized tests for investigating the present status of foreign-language instruction and the effect of varying conditions of native ability, age, curriculum, method, and organization. Objective, standardized tests were a necessity if these matters were to be studied convincingly.

The writer was requested to undertake the construction of a French grammar test that would be valid, reliable, comprehensive, and administratively feasible as to time requirements, ease of administration, scoring, and interpretation The choice of the various items that were used in the test was determined by two principal aims. First, the test was to be a measure of the achievement of students in French grammar in different semesters of high school and college. Second, an alternative and equivalent form called B was not only to duplicate some of the grammatical principles incorporated in Form A, but also to introduce other important grammatical questions, making the two tests supplementary to each other and, therefore, comprehensive when taken together. With these purposes in view, therefore, every item was based on the relative weight given it by authoritative American and French textbooks, by the College Entrance-Board Examinations, the New York State Regents' papers, and various other achievement tests. The preliminary forms consisted of forty-eight items, later increased to fifty for convenience and accuracy in scoring, which were classified as follows:

Classification	Number
Use of the article	3
Partitive construction	6
Predicate nouns	2
Nouns and adjectives	5
Pronouns: conjunctive, disjunctive, reflexive	5
Pronouns: interrogative, relative, demonstrative	5
Verbs: tenses, moods, idiomatic uses	16
Adverbs, prepositions, numbers	6

The test technique chosen was that of the selection or multiple-choice type with four alternative responses. Preliminary experimentation had shown that this technique gave greater objectivity and ease of scoring, a larger pupil response in a given time, and higher reliability than the completion or recall type of technique. The following sample will illustrate the nature of the test:

He used to sell beautiful fruit.

Il vendait
- beaux fruits.....( )
- beau fruit.....( )
- du fruit beau.....( )
- de beaux fruits.....( )

The instructions were to the effect that under each English sentence there were four suggested French translations, one of which was correct, and that it was to be underscored. Twenty-two minutes was the time limit.[1]

A preliminary trial of the tests was made with 1,366 students at the University of Wisconsin in May, 1925. The test items were then arranged in order of difficulty on this basis. The tests, both Forms A and B, have since been given elsewhere to about ten thousand high-school and college students. Table I shows the medians in terms of the percent and number right and the upper- and lower-quartile points for the original 1,366 students in the various semesters. A distribution table from which these statistical measures were computed will be found in a bulletin by the writer published elsewhere.[2]

The outstanding facts in the table are the fairly uniform rise in the medians from semester to semester. Overlapping has been found in all school subjects where achievement tests have been given, but it appears to be strikingly shown in achievement in the foreign languages. The value of tests to secure homogeneity in classification and the desirability of other comparable tests in other abilities developed by foreign-language instruction become

[1] The tests have been published by the World Book Company, Yonkers-on-Hudson, New York.

[2] Cheydleur, F. D. *The American Council French Grammar Test: Preliminary Experiment at the University of Wisconsin.* Madison, Wisconsin, University of Wisconsin, 1927. pp. 16-17. (Bureau of Educational Research, Bulletin No. 8)

at once evident. At the University of Wisconsin and at most higher institutions, two years of French earned in accredited high schools count for one in college and qualify the student for admission into second-year work. Experimentation with the American Council Alpha Tests has shown that this basis of evaluating credits accords with the results of objective tests.

TABLE I

SCORES ON THE FRENCH GRAMMAR TEST, SELECTION TYPE, UNIVERSITY OF WISCONSIN, 1925

Semester	Number of Students	Lower Quartile	Median	Upper Quartile	Norms in Percent	Norms in Number Right
(1)	(2)	(3)	(4)	(5)	(6)	(7)
First	86	30.4	35.8	47.0	36	18
Second	378	46.4	52.2	58.9	52	26
Third	93	50.3	55.7	61.2	56	28
Fourth	410	52.9	58.7	64.0	59	29
Fifth	15	51.5	58.5	68.5	59	29
Sixth	137	56.8	63.8	71.0	64	32
Seventh	98	57.8	66.3	79.8	66	33
Eighth	149	61.3	69.9	80.4	70	35

The correlations found between the results of the selection tests and the final or term grades were:

Semester	Correlation Coefficients
First	.48
Second	.50
Third	.56
Fourth	.47
Fifth	.49
Sixth	.32
Seventh	.45

A fairly high positive correlation appears between achievement in grammar and the ratings given by instructors in the subject as a whole. In any battery of tests to measure achievement in the foreign languages under present conditions, a grammar test must play an important rôle.

At Wisconsin the term mark for the first four semesters of French is made up at the end of each half-year by counting the instructor's class-rating of his students as equal to two and the final examination, set and corrected by a committee of teachers, as one. Although these departmental tests are not designed—

as standardized tests are—to discover the relative achievement of each semester but rather the degree of mastery of each particular semester's work, still they are as objective as the essay type of examination can be made. Furthermore, because they are corrected by a committee, they offer less play for the subjective element than when corrected by the individual instructors. It was for this reason that it seemed desirable to correlate the scores in the objective-selection test with the departmental examinations and with the marks given the students in the first four semesters.

The correlations, which are given in Table II, between the objective tests and the different ratings are fairly high, but not so high as those between the selection test and the final marks. The results indicate that the instructors in the first four semesters at Wisconsin gave much weight to the knowledge of grammar. This conclusion seems to be particularly true, if we examine the

TABLE II

CORRELATION COEFFICIENTS OF SCORES ON THE SELECTION TEST AND THE DEPARTMENTAL EXAMINATIONS

Semester	Number of Students	Mark in Final Department Examination	Final Class Marks	Mark in Final Grammar Test	Mark in French-English Translation
(1)	(2)	(3)	(4)	(5)	(6)
First.....	85	.43	.46	.25	.33
Second.....	323 to 296	.43	.49	.40	.32
Third.....	92 to 71	.38	.54	.59	.34
Fourth.....	297 to 273	.45	.42	.44	.32

correlations in third-semester work, for although during this period systematic instruction in formal and functional grammar was discontinued, yet we had a correlation coefficient of .56.

Numerous correlations between the selection test and such other measures of achievement, as marks received in class work, in French-English translation, on grammar tests, and on examinations, were made for different levels.[3] Because of lack of space these figures are omitted, the facts gathered from them are summarized in the next few sentences. First, the medians for the

[3] *See op. cit.*, Table VII. pp. 30-31.

objective test and those for the other marks were rather wide apart. This was to be expected, since the units of the scales were entirely different, and, although the medians approach each other from semester to semester, this fact probably has no significance. Second, it was noted that the standard deviation in all but two cases was quite small. Third, the various correlation coefficients obtained by relating the selection test with the others showed a positive and fairly high correlation. Fourth, it should be stated here that the odd and even numbers of the first A form of the selection test for 1,320 papers yielded a correlation coefficient of .73. By the Spearman-Brown prophecy formula this corresponds to a reliability coefficient of .84, which is considered by competent authorities as distinctly high.

While the tabulations of marks other than those of the achievement test may seem insignificant to some educational statisticians, the writer believes that they have a bearing on the subject of the investigation since they illustrate in a concrete way the tendency of instructors to bunch their grades in the narrow compass of from 50 to 100 percent instead of from 0 to 100 percent. Furthermore, while the comparisons made between the medians of the selection test and those of the other examinations may be considered illegitimate on the ground that the units of the scales are entirely different, it seems to the investigator that while no significance may attach to the fact that the medians in the selection test and the final grades approach each other, the comparison does bring out in a striking way one of the fundamental differences between an achievement test and the regular type of examination. That is that the former shows progression from semester to semester, whereas the latter remains practically stationary in all semesters. This state of affairs is what an educational expert would naturally expect, but a language instructor without training in educational statistics and their interpretation would hardly look for and understand the cause and the meaning of the divergence in the medians compared.[4]

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[4] This explanation of the reason for introducing certain tables in this study appears called for in view of criticisms offered the writer by Professors V. A. C. Henmon and C. L. Hull, of Wisconsin, both of whom read this manuscript and made valuable suggestions.

After the preliminary experiment with the selection test at the University of Wisconsin, it was administered on a much wider scale in many towns and cities in various parts of the United States. Forty-four schools of different sizes and types in ten states ran the tests through about January, 1926, and forty-five in eight states gave them about June of the same year. Three colleges employed them in their 1925 summer schools; during 1926, three put them through at midyear; six tried them out in June; and three used them in their summer sessions. The higher institutions cooperating in this further testing are located in six different states. Two tables given in the Appendix of this article (see Tables V and VI) present some of the results of this more comprehensive investigation and show particularly the measures of reliability of Forms A and B for the eight semesters at the lower and upper levels of instruction.

Through the wider experimentation with the test the reliability coefficient based on 9,664 cases was found to be .87, and when this latter was "stepped up" by using the Spearman-Brown formula, it became .93. The results from nineteen private and public schools located in various sections of the country, where the tests were evidently administered with particular care, deserve mention here. The correlation of A and B given in these schools was .94; this is a distinctly high reliability coefficient, when it is remembered that it was obtained without the employment of the stepping-up process. For individual semesters or years, the coefficients ranged from .72 to .92.

The further validation of the test was shown by the following correlations with various outside criteria. The correlation with teachers' marks based on 1,436 cases was .55. The correlation with the completion type of grammar test in the American Council Alpha French Test based on 474 cases was .83; with silent reading, 177 cases, .60; with composition, 186 cases, .65; and with vocabulary, 442 cases, .78. The correlation with the grammar part of the Columbia Research Bureau French Test was .89; with comprehension, .71; with vocabulary, .86—these computations were based on 61 cases.

When the record of the college group was compared with that of the high schools an interesting difference was noted. The means

of the high schools increased from semester to semester, while the college means were larger for the first four semesters and smaller for the last four.[5] This seemed to indicate that the higher institutions laid more stress on grammar during the first half of the course and then changed the emphasis to literature. It is probable that a reversal of the situation would be demonstrated, were it possible to construct and administer a suitable achievement test in both schools and colleges. No striking differences in the other measures of reliability, either of central tendency or of scatter, were noted for the college groups.[6] Perhaps the most unexpected one to a teacher of language would be the correlation obtained by matching all the A and B forms in this group. Whether we take the raw coefficient of .81 or the reliability coefficient of .90 (applying the Spearman-Brown formula), the reliability is not so high as that for the schools. This is quite likely the result of a higher selective procedure operating in colleges than in schools, which would reduce correlation, according to the principle concerning the effect of homogeneity of groups on correlation.

The final step in the construction and validation of the French Grammar Test, Selection Type, was to combine all the available results from Forms A and B since they were approximately of the same difficulty. The results secured by combining the two tests are shown in Tables III and IV—the former for the schools and the latter for the colleges. These summarize the latest and largest distribution of scores made in this experiment and show the number of cases, the upper and lower quartiles, and the medians expressed in percents and number right. No marked changes appear, though it might be observed that the new norms are slightly lower than the former ones for A and somewhat higher than the earlier ones for B, just as should be expected from combining the two forms. It will also be noted that the total number of cases at the lower level of instruction has been increased to 12,801, and at the higher level to 9,499, making a grand total of 22,300 tests with which the problem of overlapping of achievement in the present classification of students in our schools and colleges may be studied.

[5] See Table V in the Appendix to this article.
[6] *Ibid.*

If the medians or norms given in Tables III and IV are examined, we see that the increments of gain from semester to semester in the schools are more even than those for the colleges. This would lead us to conclude for one thing that the institutions of secondary education study French grammar more systematically than those of higher education. Furthermore, if we consider the range of medians, in school running from 27 to 76 and in college from 36 to 69—we are here using the medians expressed in per-

TABLE III

DISTRIBUTION OF HIGH-SCHOOL SCORES IN FRENCH GRAMMAR TEST, SELECTION TYPE

Semester	Number of Students	Lower Quartile	Median	Upper Quartile	Median in Percent	Median in Number Right
(1)	(2)	(3)	(4)	(5)	(6)	(7)
First	2,372	20.1	26.7	34.9	27	13
Second	2,156	27.4	35.9	45.3	36	18
Third	2,750	36.3	45.5	55.4	45	23
Fourth	1,927	42.8	52.2	61.8	52	26
Fifth	1,600	51.1	60.3	68.5	60	30
Sixth	1,047	54.9	64.4	73.7	64	32
Seventh	415	60.4	70.5	78.7	71	35
Eighth	534	67.0	75.7	82.9	76	38

TABLE IV

DISTRIBUTION OF COLLEGE SCORES IN FRENCH GRAMMAR TEST, SELECTION TYPE

Semester	Number of Students	Lower Quartile	Median	Upper Quartile	Median in Percent	Median in Number Right
(1)	(2)	(3)	(4)	(5)	(6)	(7)
First	1,568	30.3	36.4	42.9	36	18
Second	1,806	43.6	51.0	59.3	51	25
Third	1,412	45.2	52.7	60.7	53	26
Fourth	1,525	50.3	58.0	65.1	58	29
Fifth	1,282	52.5	60.6	69.6	61	30
Sixth	667	51.3	61.7	70.2	62	31
Seventh	398	54.8	63.6	74.9	64	32
Eighth	841	59.5	69.1	80.1	69	35

cents—it is quite obvious that there is relatively greater progress made in grammar in the schools than in the colleges. This seems to demonstrate a state of affairs quite contrary to the generally

accepted opinion of language teachers in college, namely, that grammar is poorly taught in schools. This observation, of course,

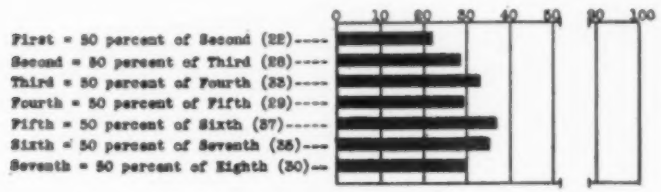
0 10 20 30 40 50 90 100
First = 50 percent of Second (22)----
Second = 50 percent of Third (28)----
Third = 50 percent of Fourth (33)----
Fourth = 50 percent of Fifth (29)----
Fifth = 50 percent of Sixth (37)-----
Sixth = 50 percent of Seventh (35)---
Seventh = 50 percent of Eighth (30)--

Figure 1. Percents of overlapping among the scores made by the students on the selection test

is limited to French, since that is the subject under investigation in this particular study.

Figure 1 illustrates in a concrete way the overlapping of classification found in practically all schools and colleges that used the tests. It indicates that 22 percent of the first-semester students in school did as well in French grammar as 50 percent of the second-semester students and that 28 percent of the second-semester students did as well as 50 percent of the third-semester students, and so on through the last semester. If the order is reversed we also read that 50 percent of the eighth-semester students did no better than 30 percent of the seventh-semester students, and so forth back to the first semester.

This condition of affairs, which is substantially confirmed by the results of the other American Council Tests in vocabulary, grammar, comprehension, and composition, obviously calls for the serious consideration of a new method of classifying students in our schools and colleges, one that recognizes actual achievement in a subject as the basis of promotion rather than credits earned on units of time and certain programs of study and the old essay forms of examinations alone.

For the French instructor especially this type of test ought to be of particular interest because of the simplicity of its administration. With it one can quickly ascertain the maximum amount of grammatical information possessed by the student in the minimum amount of time, the test requiring for its answers from

10 minutes in the higher classes to 22 minutes in the lower. It can be corrected at the rate of thirty forms per hour and double that rate with practice.

It can be used for diagnostic purposes as the frequency of errors can be quickly ascertained. For example, it was found by the first experiment that the rule for the repetition of the article before nouns was violated 98 times out of 1,320 cases; that of the partitive construction after a general negation, 552 times out of 1,320 cases; and that of the subjunctive in a clause of characteristic, 1,004 times out of 1,320 cases. Lack of space forbids a more complete development of this particular use.

The test can also be employed to disclose the effect of certain types of teaching on grammar study, for instance, that of the direct method and the reform method; to compare the work of different teachers in the same school or system, or that of various sections of the country; to contrast the instruction given in public and private institutions; to compare the achievement of summer-school students with those of the regular academic school or college session. For instance, it was learned that the average score of beginning students of French at the end of the Summer Session of the University of Wisconsin, at the close of the Summer School of the University of Illinois, and at the June finals of the Wisconsin University High School was approximately the same. This interesting and surprising fact has been confirmed by further testing in other schools and colleges and proves what the earnest and mature student can accomplish by concentration, and justifies also the present practice in evaluating such work, a practice that has been questioned.

In conclusion it might be claimed for the American Council French Grammar Test, Selection Type, that it is highly standardized. It meets in a high degree the criteria set by educational authorities as to validity, comprehensiveness, reliability, and objectivity. It may be employed as a substitute for the old-time grammar tests, or as an alternative for other achievement tests of the completion type, or as a supplement to various standardized tests in vocabulary, reading, and composition now available for use in schools and colleges.

APPENDIX: FACTS REGARDING THE RELIABILITY OF THE SELECTION TEST

Several striking facts were brought out by the wider administration of the tests in high schools and colleges during 1926. These facts are summarized in Table V.

The average increment of the means of Form A from semester to semester was 3.4; that of Form B, 3.1. Hence, it was evident that A was somewhat easier than B. Since this second administration of the selection test, both forms have been equalized in difficulty as nearly as possible. This increment shows, as should be expected, steady progress in grammar achievement.

The standard deviations of the two forms were small, varying from 6 to 7.5 in the different semesters. Compared with that of the French grammar test in the Columbia Research Bureau set which ranged from 12 to 13, or with that of the American Council Alpha French Grammar test which was 11, they were decidedly smaller. Hence, it may be claimed that the selection test from this point of view has the highest reliability.

The raw coefficients of correlation of the various semesters ranged from .56 to .85; and the correlation coefficient of the school group was .87. By applying to the latter the Spearman-Brown prophecy formula, .93 was obtained for the reliability coefficient, which was decidedly high. These various coefficients illustrate in a forceful manner the principle that increasing homogeneity in the population tested means decreasing correlation.

Because some educational statisticians, such as Monroe and Odell, recommend that the ratio of the probable error of measurement to the mean be used as the best measure of the errors of measurement, it has been employed here for those who prefer this finer distinction in reliability (see Column 7, Table V).

In Table VI are summarized the results of a similar extensive use of the test in January, 1927. If Tables V and VI be now compared in order to learn the effect of combining the results from the Forms A and B on the reliability of the selection test, we observe that the average increment in the means from semester to semester being 3.3, there is very little change to record in the measures of central tendency through the increased number of cases. An inspection of the standard deviations in Table VI reveals a slight but positive improvement in this measure of scatter or variability when matched with those in Table V after the two forms in the various semesters of the latter have been averaged.

To discover the nearest reliability coefficient for the number of cases involved, the Spearman-Brown prophecy formula was applied to the raw coefficient of each semester in Table III and the results included in Table VI.

TABLE V

RELIABILITY OF THE FRENCH GRAMMAR TESTS—SELECTION TYPE

Semester	Form of Test	Number of Students	Mean	Standard Deviation	Correlation Coefficient	$\frac{PEm}{Mean}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	High Schools					
First	A	885	15.0	6.0	.56	.201
	B	885	13.1	6.7		
Second	A	796	18.9	6.8	.79	.113
	B	796	18.6	6.9		
Third	A	1,002	23.9	6.9	.81	.087
	B	1,002	22.2	7.0		
Fourth	A	793	27.1	7.3	.76	.128
	B	793	25.1	7.0		
Fifth	A	555	31.2	6.3	.72	.075
	B	555	29.1	6.6		
Sixth	A	210	36.3	6.2	.74	.061
	B	210	33.6	6.4		
Seventh	A	154	36.1	7.5	.85	.054
	B	154	33.7	7.2		
Eighth	A	205	38.5	6.5	.77	.059
	B	205	34.9	7.0		
	Colleges					
First	A	593	19.2	4.7	.54	.114
	B	593	17.5	4.5		
Second	A	581	27.3	6.0	.70	.085
	B	581	24.4	5.9		
Third	A	591	27.5	5.5	.65	.082
	B	591	25.3	5.4		
Fourth	A	602	31.5	6.1	.72	.071
	B	602	28.9	6.0		
Fifth	A	258	29.2	6.0	.76	.073
	B	258	27.2	6.4		
Sixth	A	240	31.5	6.3	.74	.074
	B	240	28.1	6.7		
Seventh	A	156	33.7	7.4	.81	.063
	B	156	31.6	7.0		
Eighth	A	205	34.8	6.5	.79	.062
	B	205	31.4	6.9		

These correlation coefficients are probably somewhat higher than the actual correlation of Forms A and B which the various semesters would give. However, we believe that they are approximately correct. For this reason, we used

them to calculate the ratio of the probable error of measurement to the mean. These latter consequently appear smaller than those in Table V and should be less on account of the augmenting of the number of cases. What has

TABLE VI

RELIABILITY OF AMERICAN COUNCIL FRENCH GRAMMAR TEST—SELECTION TYPE

Semester	Number of Students	Mean	Standard Deviation	Correlation Coefficient	$\frac{PE_m}{Mean}$
(1)	(2)	(3)	(4)	(5)	(6)
	High Schools				
First	2,372	13.9	5.5	.72	.141
Second	2,156	18.5	6.6	.88	.083
Third	2,750	23.1	6.8	.90	.062
Fourth	1,927	26.2	6.9	.86	.074
Fifth	1,600	29.8	6.3	.84	.057
Sixth	1,047	32.0	6.6	.85	.054
Seventh	415	34.3	7.1	.92	.039
Eighth	534	37.1	6.1	.87	.039
	Colleges				
First	1,568	18.4	4.8	.70	.096
Second	1,806	25.6	5.9	.82	.066
Third	1,412	26.4	5.6	.79	.065
Fourth	1,525	28.8	5.7	.84	.053
Fifth	1,282	30.4	6.1	.86	.051
Sixth	667	30.5	6.5	.85	.055
Seventh	398	32.2	7.2	.90	.047
Eighth	841	34.8	7.0	.88	.049

been shown concerning the school group is relatively true of the college group, namely, that the increased number of cases sets forth an increase in the reliability of the tests.

It might be of interest to state here that in the whole process of standardizing this test over 25,000 forms were used in over eighty schools and twenty colleges and that it has been more widely administered than any other modern language test known to the writer.

THE READING PROCESS IN LATIN[1]

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THE MONOGRAPH of Judd and Buswell on silent reading, combining as it did an unimpeachable scientific technique with an extreme denunciation of Latin as now taught, came as a distinct shock to the classical teachers of America. The authors spoke with the prestige of long and careful research into educational psychology, and most of the teachers of Latin, while they were not convinced that all the conclusions were fair and valid, were in no position to offer material criticisms that would appeal to anyone not already committed to the value of the classics. On the other hand, educators who set little value upon Latin found in the document a store of ammunition which they were beginning to need, because of the present reaction of psychologists from the extreme anti-disciplinary view of a generation ago, and especially in the light of the soundly scientific and fair-minded attempt of the classical world, as represented by the American Classical League, to set its own house in order. Hence, it seems proper to examine the Judd-Buswell monograph,[2] both for the sake of its real contribution to our knowledge of the facts underlying the teaching of Latin, and for the purpose of setting against its extreme criticisms of Latin certain historical aspects of the reading process which may serve to mitigate the judgment of the investigators, and to admit the possibility that reconstruction rather than extirpation is the real remedy for the alleged incubus of Latin upon the schools.

The monograph embodies a technique which has been gradually perfected during more than a quarter of a century of extremely careful experimentation with the observation of eye-movements in reading. These eye-movements were early recognized as indications of the nature of the subjective process involved in reading. This notion was gradually developed into an hypothesis, from which

[1] An address delivered at the sixth annual meeting of the Kentucky Classical Association at Georgetown, Ky.

[2] *Silent Reading: A Study of the Various Types.* Chicago, University of Chicago, 1922. (Supplementary Educational Monographs, No. 23)

few psychologists will dissent, and which is stated by the authors as follows:

> A printed page [is] . . . . a source of mass impressions which the active mind begins to organize and arrange with reference to some pattern which it is trained to work out. If the mind is fitting together the impressions so as to bring into high relief grammatical distinctions, the grouping of words and the distribution of emphasis will be according to one pattern. If the mind is intent on something wholly different from grammar, as, for example, the experiences which the author is trying to picture, the whole physical and mental attitude of the reader will be very different.[3]

In order then to determine what mental processes are involved in various types of reading, including the reading of Latin by high-school pupils, the investigators made a careful study of the eye-movements of a number of such pupils while the latter were reading various sorts of material for various purposes. The technique of observation used is so well known to psychologists that a mere reference to a previous account of it was deemed sufficient.[4] Briefly, it consists in the reflection of a beam of light from the cornea upon a photographic plate. The pauses or fixations of the eyes—during which alone visual perception occurs—can be accurately measured to the twenty-fifth of a second, and the exact spot on the page which is focal in each such fixation, together with the number, direction, and sequence of the intervening movements, is determined with mechanical precision.

It is known that the normal reading of modern vernacular matter which is clearly understood as read is accompanied by a fairly regular succession of forward movements of the eyes. The interruption of this perceptual process and the search for a way out of the attendant bewilderment are signalized by disturbances of this regular succession of forward movements and pauses—sometimes by a lengthening of the fixations, sometimes by a succession of fixations near one point approximately central to the focus of difficulty on the page, and sometimes by more or less irregular wanderings of the eyes.

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[3] *Op. cit.*, p. 4.

[4] Namely, to C. T. Gray's *Types of Reading Ability as Exhibited through Tests and Laboratory Experiments.* Chicago, University of Chicago, 1917. (Supplementary Educational Monographs, No. 5)

The investigators found such disturbances present in varying degrees when the pupil was reading with the intention of answering questions on the content of the matter read, of paraphrasing it, or of answering questions as to its grammatical structure. In the reading of Latin, these disturbances became so numerous and violent that in the judgment of the investigators they entirely supplanted the normal forward-moving course of the line of vision, and forced a conclusion which is stated as follows:

> Pupils in the third year of Latin do not read the words which are offered to them. The obvious fact shown by their eye-movements is that they do not even remotely approach the reading attitude. It is as inappropriate to speak of reading in describing what Latin students do in the high school as it would be to use the word "flying" in describing what people do when they walk.[5]

Although the parallel is obviously an overstatement, we may nevertheless accept the conclusion as practically true for the particular pupils studied. For the sake of argument, we may even go further and admit that the fourteen third-year pupils studied may be a valid sampling of the million or so of Latin pupils in the high schools of America. All that this would amount to is that high-school pupils do not really read Latin, in the sense in which they read English. But, there is a wide gap, bridged by various assumptions from unverified educational theory, between this and the more general conclusions which follow:

> The oldest subject of instruction in our high schools has set an extreme example of a type of treatment wholly opposed to reading. Pupils do not read Latin. One can dismiss as absurd under existing conditions the idea that the ordinary pupil ever gets any literary thrills out of Latin. . . . . It is doubtful whether this generation of Latin teachers can be made to understand the extent to which they have ruined their subject. . . . . It is nothing less than preposterous for schools to consume the time of students and leave them with the handful of ashes that Latin gives them in its present third year. Latin has lost its vitality. It is a series of barren exercises in analysis of grammatical forms; students are kept busy in the mere piecing together of English words picked out one by one from a vocabulary. It is the example par excellence of lean years of analysis that have fed without profit on all the accumulations of the child's intellectual life.[6]

Classical teachers cannot but shudder at the irreparable damage which these conclusions may work on educational practice if they

[5] *Op. cit.*, pp. 4-5.
[6] *Op. cit.*, p. 156.

are accepted; for they are not only in great measure unproved, but they are in part flatly contradicted by equally scientific evidence, from other sources, of the type summarized in the *General Report of the Classical Investigation*. Hence, the present discussion will attempt to adduce certain considerations which may set the reading-process in Latin in a different light.

To this end let us see what the greatest teacher of Latin in ancient times has to say about reading perception, in contrast to the perception of oral language. Quintilian says:

> But there are certain advantages in hearing, and certain other advantages in reading. He who speaks stirs us by his very living breath, and warms us not by the mere indirect imprint (*imagine et ambitu*) of his thoughts, but by his thoughts themselves. It all lives and moves, and we reach out and catch each thought new-born, whether welcome or unwelcome (*cum favore ac sollicitudine*). Reading is free (i.e., from the limitations of speech); the rush of delivery does not hurry it along; we may go over it again and again, either to clear up doubt, or to fix it firmly in memory. Let us then re-read our material, and work it over; and, as easy digestion demands that we do not swallow our food until it is chewed and softened, so reading material should not be committed to memory and used as a model in the raw, but only after it is reduced (*mollita*) and, as it were, digested by frequent reconsideration.[7]

While Quintilian here is doubtless not attempting what we should call a psychological analysis of the speech process, he nevertheless recognizes that the fabric of spoken language conforms to the limitations of the ear, which must accept its impressions as they move forward in time; and written language is, in part at least, free from bondage to time sequence and may avail itself of the liberties of the eye. He even prizes those liberties in a way that is entirely alien to the demands of the modern reading expert.

Now, my thesis is that Quintilian represents a distinct stage in the historical development of the reading-process. Therefore, to obtain the proper evaluation of that process as applied to Latin, we should review its whole history and see what reading meant to the Roman writer, reader, and teacher, before we attempt to force it into the mould which is being prepared by the modern teacher of the art of reading.

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[7] *Institutes of Oratory*, X, i, 16-19.

Three stages can be discerned in the development of the reading-process as a social tradition. The first stage I shall call the picture-writing or pre-reading stage. It is mainly prehistoric, as far as the Mediterranean tradition of our educational system is concerned. The second stage is the historical stage of oral reading, which is just now coming to an end. The third is the stage of silent reading which is now being inaugurated for the reading of modern languages by the efforts of scientific investigators of the psychology of reading. The purpose of our examination is to see whether criticisms based on the educational situation of today are fully applicable to a literature produced two thousand or more years ago.

What I have called the pre-reading stage was essentially that in which the process of gathering thought from recorded symbols was mediated by a purely visual perception. It is well known that written language, wherever its origin is certain, has arisen out of picture-writing.[8] In the beginning there was no distinction between this and painting or drawing; the essence being a recognizable copy of an absent thing for the eye to see. Hence, whatever psychological process was found in these arts was also found in this primitive writing. Now, in the perception of such art, the eye is entirely free from any temporal limitations, can roam at will over the entire canvas, and select in any order that seems significant the features which are to be perceived. At that period spoken language was already highly developed, but it had not become associated in any fixed way with the process of visual perception. One had to hear language in the order in which it was spoken; but one could and did read picture-writing in any order he chose, so that the eye-movements in this primitive reading must have had an unqualifiedly roving and irregular character.

The transition from this stage to reading proper came about through the development of two types of habit on the part of those who specialized in the art of picture-writing and picture-reading. The first of these was the gradual conventionalization of the symbols, until they came to be no longer recognizable directly by the uninitiated as representations of their respective meanings,

[8] For a clear and interesting sketch of the history of the art of writing, see Judd's *Genetic Psychology for Teachers*. New York, D. Appleton and Company, 1903. Chap. VII.

but were known to mean so-and-so because the youth from generation to generation were taught to give them those meanings. Along with this arose the practice of recording thoughts by a series of such symbols arranged to tell a message or story.[9] There is yet no definite attachment of the items in the record to the exact language of the story. The only limitation upon eye-movements in this process is that they follow in general a spatial arrangement of the symbols, corresponding to the logical or chronological sequence of the events or ideas. The eye at any point might roam at will over the page, coming back only to the next symbol when its turn for interpretation came. No doubt, there were periods of puzzling, when the recognition of a symbol or the recalling of the narrative proved difficult; and at such moments the eye-movements would roughly resemble the frequent and concentrated fixations found at moments of bewilderment in the modern pupil; but there was yet nothing at all approximating any true reading process.

The second, the stage of oral reading or reading proper, is that in which the succession of written symbols has become so organized in the mind with the succession of oral sounds constituting spoken language that they accompany each other in detail. This stage is fairly launched when the written symbols have become so conventionalized that they carry no certain meaning apart from their oral accompaniment and must occur in a fixed order dependent upon that of the spoken language. It is not fully developed, however, until the oral so dominates the written that what the eye sees, the mind interprets by way of the auditory-vocal word-imagery rather than directly.

It would be both tedious and unnecessary to trace in detail even what we know of the evolution of the reading process during this stage. Fortunately we have an abundance of written documents in languages at various levels of its development. In Chinese, for example, each written word is a unitary symbol, which suggests to the mind the idea or meaning more definitely than it does the spoken word; so that the script is clear to persons from various provinces whose spoken dialects are mutually unintelligible. In

[9] See Judd, *Op. cit.*, p. 200, for a specimen of such a message. In the Museum of the Heye Foundation in New York there is a beautiful specimen of an Indian picture-writing chronicle stretching over many years.

the Egyptian hieroglyphic the spoken word has become a fairly constant accompaniment of the written symbol, but there is little analysis of the spoken word into its sounds or attempt to represent any phonic element of a word by a special written symbol. This step is taken by the Assyrian, where the written symbol is not usually in itself significant, except that it merely suggests a spoken syllable. This requires some combination of written symbols to make a word. The western Semitic languages carried the analysis further by making each written symbol represent a single consonantal sound, leaving the vocalization to be supplied from the auditory-vocal tradition. This true, but primitive, alphabet was completed by the Greeks, who added written symbols for the vocal sounds; and one form of their alphabet has come down with little modification by way of Latin to the modern languages of western Europe.

The dates of this development are worth mentioning. Oral reading, in contrast to the visual interpretation of picture-writing, seems to have been fairly well developed in both the Nile and the Tigris-Euphrates valleys by the beginning of the fourth millennium B. C. The cuneiform syllabary of Assyria prevailed in southwestern Asia well past the middle of the second millennium B. C., while it is fairly certain that a consonantal alphabet was in use in Palestine by the end of that millennium. The Greek alphabet was in use early in the first half of the following millennium. Thus oral reading has a history of at least six thousand years, and alphabetical writing of nearly half as long. The Greek and Latin classics are much nearer to the beginning of alphabetical writing than they are to our own day.

Let us now try to reconstruct the psychological history of the reading process through this evolution of the form of writing. We have seen that the wandering movement of the eyes, time-free and attended by an analytical rather than a rapid forward-moving perceptual process, must have been universal in the indefinitely long prehistoric period which preceded oral reading proper. The formation of the alliance of the written symbol with the spoken word must have been an extremely slow process, and for a long time could not have affected the eye-movements and the perceptual process to any extent except to determine their general direction

on the inscribed surface.[10] An explanation of the way in which this primitive analytical reading-process, with its free sweep of the eyes to any part of the page, became transformed into that of Quintilian's without losing altogether its analytical character, involves a study of the social and educational conditions under which the art of reading was transmitted.

It is probable that we must trace our educational ancestry to Egypt rather than to Babylonia. In Egypt the art of writing, and consequently education, were in the hands of the priests. They were heavily subsidized or even endowed with lands, and formed an exclusive leisure class. Reading was not a usual accomplishment of the busy artisan or tradesman, and there was no pressure upon the speed of the process. Moreover, the long-preserved kinship of writing with pictorial art in Egypt must have favored the survival of the analytical method of visual perception in reading, with its attendant wandering of the eyes, and the necessity of careful and frequent fixations and backward sweeps in order to distinguish the truly phonetic from the pictorial and determinative symbols, and to determine the order in which they should be read. Hence, the perceptual process showed considerable tardiness in binding itself down to the forward-moving, time-limited, ear-determined type which is becoming more and more prevalent today.

Since the extremely conservative priests of Egypt[11] were the teachers also of the earliest literati in Phoenicia, and since these in turn set the fashions of teaching amongst the Greeks, and these amongst the Etruscans and Latins, the tradition of the schools must have handed on to the West the habit of slow and analytical reading, with frequent refixations and backward eye-movements. This in turn must have reacted upon the written literature. Docu-

[10] An incidental evidence of this is that different languages adopted different directions of reading, and some even retained a variety of methods to a comparatively late date. Chinese is read from top to bottom, beginning at the right; Semitic from right to left. Egyptian used either direction, or even other arrangements, according to the requirements of monumental inscription. Early Greek and early Latin varied. The *Praenestine fibula* (Diehl, *Inscr. Lat.*, p. VII) reads from right to left; the early forum inscription known as the Stone of Romulus (*Id.*, p. 1) has the alternating or boustrophedon order.

[11] It is possible of course that the Greek alphabet owed more to Babylon or to Crete than to Egypt. This does not affect our argument, since educational conditions in both those lands must have been in the main similar to those in Egypt.

ments written for a leisure class trained to such analytical reading, especially in such languages as Greek and Latin, where inflected forms permitted extreme freedom of word-order, would naturally have availed themselves of this freedom to secure precision or rhetorical effect. The use of these documents in the schools of Greece and Rome, especially after the rise of prose and of a conscious educational method, in turn gave rise to the practice of more and more minute analysis, in which the development of the science of grammar was a quite natural result. The technique of these schools was in turn taken over by the early Christian teachers trained in them, who have handed it down to the vernacular schools of modern times. But the palmy days of analytical reading, as we shall see, are to be found in the centuries of the classical literatures of Greece and Rome.

Quintilian writes almost at the end of this period of reflective analytical reading, conditioned as it was upon a literary leisure class, habitually utilizing to the full the rhetorical resources of highly inflected languages. The eighteen centuries since his day have witnessed a slow but steady development toward the age of silent reading, whose beginning we are now witnessing. The first part of this period is rather one of the decay and dissolution of those aspects of society on which the old analytical reading habit was conditioned. It may be said to end about the time of the crusades in the twelfth and thirteenth centuries. The second, from then to the nineteenth century, is an age of inventions and social evolution which have made possible and, indeed, necessary a race of super-readers and a new technique of reading.

Both of the main factors in retarding facility of reading perception—the inflected system of Greek and Latin, and the literary leisure class—were already tending to dissolution even before Quintilian's day. As to the first, I may cite the simple and short perception-groups of Plautus' language, in contrast to the involved and measured pomp of the Ciceronian and Augustan writers. This is because Plautus wrote for the masses and in their language, and, hence, appealed to the forward-moving perceptual processes of hearing. The early Christian literature in Greek, dating approximately from Quintilian's time, shows, in general, the same features as Plautus—no attempt at fine writing; short perception-groups;

and a much greater tendency than in classical Greek to hold the syntactical structure to the sequence of words, usually in addition to inflectional concord, but sometimes in defiance of it. It is evident that underneath the literary élite of Latin classical days lay the ear-thinking masses, largely inarticulate, unnoticed except when they were satirized by a Petronius, but bearing the hidden germs of a new life of the reading-process.

The revolution which reached its climax in the fifth century A. D. quite swept away the social conditions of the old analytical reading-process. The barbarian conquests greatly reduced surplus wealth and substituted for the old cultured aristocracy a new and almost wholly illiterate one. The creative spirit of the old pagan literature of Rome was quite dead; but there had already arisen a new and virile literature, with aims religious and moral rather than esthetic. This removed the temptation to write for rhetorical effect, and the consequent taste for manipulating word-order and depending upon inflection to bind the language together. Moreover, from the fifth century on, the re-writing or rearrangement of the sacred literature was in great measure adjusted to the education of a largely illiterate populace by public oral reading (including chanting and singing) in the churches. The schools, it is true, carried over from their pagan origins the tradition of an analytical, eye-free reading; but there was no social compulsion back of it, and consequently nothing to prevent its decay and the substitution of a new reading method better adapted to a new age which had not yet arrived.

By the ninth century the spoken Latin of southwestern Europe had become Romance, and a native literature in English was springing up; both bearing the essential stamp of the modern languages as opposed to Latin. The periodic sentence was rapidly disappearing. Word-order had become relatively fixed. Perception-groups within the sentence were shorter and more closely knit by position. Inflection was still present, but had become of secondary importance in determining syntax, and hence was on the way to further subsidence and the final extinction which was yet in the future. The result was the elimination of the necessity for the analytical reading process with its free roving of the eye and the complete establishment of an eye-syntax cast in the mould of the prevailing ear-syntax of the everyday man.

As we look back from the vantage-point of a thousand years later, we see that by this time there has arisen the possibility, though it was not even to begin to be realized until our own day, of building up a strictly visual reading-process. It is to be upon the foundation of the generalized sentence structure of the modern western European languages as determined by oral speech; namely, a sequence of compact perception-groups occurring in a relatively fixed order, with the inflection tending to be minimized or altogether obscured by the rapidity of the perceptual process. The eye, however, already trained to a progressive course by the age-long alliance of its movements with the racing oral speech, and emancipated from the necessity of backward swings by the subsidence of inflection, is now to be released from the brakes of the vocal movements which usually accompany silent reading in the slow reader, and is permitted to sweep forward as rapidly as the inward perceptual process will permit.

We shall now see what the social impulsions are which have translated this possibility into a necessity and are rapidly making it an actuality. The first of these was the introduction of paper into western Europe. Invented in China and brought to the West by the Arabs, it came into general use about the time of the Renaissance, and provided a cheap and abundant material on which reading-matter could be recorded. The production of such reading-matter in abundance was, however, still hindered by the slow, laborious, and costly method of copying by hand. This was eliminated by the invention of printing in the fifteenth century. It was now possible to produce books quite cheaply, and as rapidly as the demand required. This demand, however, was limited by the range of the reading public, which rests on the distribution of three conditions: the art and habit of reading, leisure, and the means to buy books. These conditions as yet were limited mostly to the favored minority. But, with the industrial revolution of the eighteenth century and the consequent rise of the masses in wealth, in literacy, and in social and political influence, the last great obstacle to an extended reading habit on the part of the population as a whole was removed. As yet, however, rapid silent reading was only a possibility. It became a necessity in the nineteenth century, with the invention of the great time-saving devices—the railway, the electric transmis-

sion of messages, motor transit, and the freeing of the hours of darkness for reading by the electric light. The printing presses more than responded to the new demands of universal leisure. Along with the spread of education, the pouring forth of a great flood of reading-matter, and the speeding up of social processes in general, there has arisen the necessity of a rapid and sure selection and digestion of what is offered; for which the leisurely processes of oral reading do not suffice.

The application of modern scientific methods to education is partly concerned with the solution of this problem of economy of time in reading. The psychologist, using all the resources of mechanical science, has analyzed the processes involved in reading and has undertaken to eliminate those which are unnecessary to the rapid and sure comprehension of the thought. The most serious of these are the backward swings of the eye and the movements of the vocal organs which attend the attempt to transmute the written words into inner auditory-vocal word-imagery.

In other words, the processes of oral speech, as concomitants of written, have served their time with the race, just as ancestor-worship, slavery, and the horse have done. Without them we should never have attained what we have; but now that they have schooled the race to certain ideals and ways of thinking, new inventions have provided more economical methods of attaining those ideals, and the old gradually becomes obsolete, except when we wish for disciplinary or cultural purposes to study or master them. Hence, we may expect that silent reading, with its swift forward-moving eye-behavior, its perception of word-groups in spatial sequence, and its neglect of the oral parallels, will become the accepted procedure in education and will produce a race of super-readers, trained to cope with the new situations confronting society.

This does not mean, however, that the ideals and the technique of silent reading can or should be applied *in toto* to the reading of classical literature.[12] For one thing, there is not the pressure

[12] Judd and Buswell (*Op. cit.*, p. 92) found that high-school pupils read French in approximately the same manner as English. In view of the acknowledged debt of modern-language teaching to Latin (*Op. cit.*, pp. 156-7), it is difficult to account for the difference between the French and the Latin records except by admitting our thesis, that French is essentially modern, and hence requires no radical reorganization of the English-speaking pupil's perceptual processes, as does Latin.

of social necessity. The canon of those literatures is closed. There is no vast crop of them being turned out annually from the press, demanding an ever-increasing speed of reading to consume it. But the chief reason for refusing to discard the reflective reading-process in Latin lies in the very nature and value of a foreign language in education. I think most persons will admit that this value consists largely in the habit of thinking the experiences of an alien race in their own language and from their own point of view. It follows that the most fruitful habit of mind with which to read the Latin classics may be ascertained from the study of those classics themselves, not from a twentieth-century psychological laboratory.

Now, it is fortunate that we have a formulation of precisely this thing in the words of Quintilian, which we have quoted. The greatest practical teacher of antiquity, a man of learning, taste and culture, familiar with practically the entire product of classical literature, has left us a deliberate estimate of what the desirable process is in reading that literature. Indeed, we can, and should, interpret that estimate in the light of what modern science reveals to us about that literature and the workings of the mind in perceiving it; but we should not be wise in hastily reversing or disregarding his judgment. The essence of this judgment is that reading is a reflective and leisurely process, and that the classical literatures were not written to be covered with all possible speed but to be grasped with deliberation and care. It is no small part of this, that they are clothed in highly inflected languages, the possibilities of which have been used to the full by their authors for a reflective, not a racing type of reader. We can no more grasp the classical authors by twentieth-century methods appropriate to a modern language, than we could grasp the significance of the age of Pericles by visiting modern Greece on a vacation tourists' schedule.

I do not mean for an instant that I would use this argument in justification of the glaring faults in the present-day teaching of Latin that are revealed by the investigation, or that I would minimize its immense contribution to our technique, even though that contribution be wholly destructive. An old building must be razed before a new one can be built on the site. Indeed, the more

progressive teachers of Latin have for years been objecting to the prevalence of unessential and non-functional grammatical detail and to the process of translation as a jig saw-puzzle procedure divorced from comprehension. This is evidenced by the report of the Classical Investigation, which has further succeeded, we may fairly hope, in impressing itself upon the great body of classical teachers. But, when we have eliminated these two faults of formal grammatical analysis and word-by-word translation of material not previously comprehended, we still have left, in the reading of Latin, problems which the pupil can solve only by reflection and analysis, which will certainly proceed in the manner by which the ancients read, not in the fashion by which the investigators would very properly have us read English. Let us accept then the immediate conclusions of the monograph, which are indeed indisputable; while strenuously denying *in toto* its application to the place and value of Latin in the curriculum. Let us take our medicine; but one who takes his medicine is not dead!

NOTE—Since the submission of this article, attention has been called to two aspects of the matter which were either overlooked or not developed in the article: "(1) the reading of Latin with ease and enjoyment cannot be accomplished in three years; and (2) a comparison of eye-movements in reading Latin with the eye-movements in the vernacular, which has many years of practice behind it, is not entirely legitimate." The writer entirely agrees with the second point made and thinks that it is involved in the argument that the perceptual process in the vernacular represents a complete fusion of the visual with the auditory-vocal perceptual process; while in Latin there is no such fusion, but the entire perceptual fabric must be built up anew along a path the organization of which is entirely novel and is conditioned by the inflected system of the language. As to the first point, if the proviso "under current methods" be added, the writer would be in agreement with this also. Probably, it would be true in most cases; but in some it certainly is not true, as the writer knows from personal experience. Both these problems, together with the further elaboration of the historical details in the development of the reading process as a social and educational tradition, are proper subjects for further research.

AN EXPERIMENTAL STUDY OF METHODS OF REVIEWING THE LESSON OF THE PREVIOUS DAY

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THIS investigation was carried on to determine whether it is better for an instructor to review the previous day's recitation by giving a ten-minute summary himself or by requiring the students to answer his questions.[1] For purposes of the experiment an elementary course in educational psychology, at the University of Texas, during 1924-25 was used. The course comprised seventy-two hours and consisted of two distinct parts, the first was given during the Fall Quarter, the second in the Winter Quarter. Two sections were organized in the fall term as follows: Section A met on Monday, Wednesday, and Friday at eleven o'clock, and Section B met on Tuesday, Thursday, and Saturday at twelve o'clock. The number of students in Section A was twenty-nine; in Section B, twenty-three.

The two sections were taught by the same instructor and in the same manner; uniform subject-matter and the same number and types of hour tests were used. The subject-matter and references were kept as nearly alike as possible by means of a detailed syllabus or outline. The method of instruction used for both sections was a combination of lectures, assigned readings, questions and answers, and class discussions. This combination was varied to suit the topics under discussion, the materials available for use, and the interests of the students.

About two-thirds of the classes were Freshmen and one-third upper-classmen, mostly Sophomores. The proportion of students with teaching experience who were planning to teach and who had had work in psychology was practically equal for the two classes. Absences per student averaged 1.1 for Section A and 1.2 for Section B.

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[1] Acknowledgment is due to Mr. Luther M. Dimmitt for his cooperation in this experiment. Without his aid this experiment would not have been possible.

In order to neutralize the difference between the psychological level of the two groups, a psychological test[2] was given to both sections. For purposes of comparison, only those students were selected in the one group whose psychological scores could be paired within a range of two points with the psychological scores of the students in the other group. The means used for measuring the effect of the two methods of making summaries was an objective final examination, consisting of true-false statements and completion exercises, which was given to both sections at the same time. The scores made on the true-false statements and on the completion exercises were combined by the standard measure method for each student.[3]

TABLE I

DIFFERENCES BETWEEN THE MEAN EDUCATIONAL SCORES MADE BY THE QUESTION-AND-ANSWER METHOD AND THOSE BY THE INSTRUCTOR'S SUMMARY FOR EACH TERM

	Fall Term			Winter Term		
	Section A	Section B	Difference	Section A	Section B	Difference
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Examination:						
Mean mark	269.0	269.0	.....	88.5	95.4	−6.9
Standard deviation	21.3	20.7	.....	10.9	11.1	3.66
Psychological Test:						
Mean score	59.1	59.2	.....	58.2	58.4	.....
Standard deviation	14.0	13.6	.....	13.6	13.2	.....

Possible variations in the instructor's method of teaching from day to day could not be eliminated nor measured, and the questions asked by the students in the two sections could not, of course, be the same. The results in this study are subject to the errors that may have come from these sources.

[2] The University of Texas Freshman Psychological Examination (1924 edition) was used. This test has a product-moment correlation of 0.45 with the average of the college marks for the fall term of 1924 for the University at large and of 0.50 for only those students who pursued five full courses.

[3] Kelley, Truman L. *Statistical Method*. New York, Macmillan Company, 1924. p. 114 ff.

The results of the Fall Term are shown in Table I. Complete records of fourteen students were obtained for each group by the process of pairing; namely, fourteen students out of a total enrollment of twenty-nine for the group for which the instructor made the summary, and fourteen out of a total enrollment of twenty-three for the group in which the summary was made by the question-and-answer method. The difference between the means of the educational scores, as shown in Table I, was zero.

The experiment was repeated during the Winter Term with the following changes in the method of procedure. Section A was increased from twenty-nine students to thirty-two, and Section B from twenty-three to twenty-eight. The method of making the summaries was reversed for the two sections; that is, Section A, which had the summary by the instructor during the Fall Term, now used the question-and-answer method, and Section B, which used the summary by the question-and-answer method during the Fall Term, now used the summary by the instructor. In all other respects the method of handling the two classes was as in the Fall Term. The same instructor who taught the classes during the Fall Term taught these two classes.

The results for the Winter Term are also given in Table I. After pairing the students by their psychological-test scores, eighteen cases were obtained from each group. According to the table the difference between the mean scores of the two sections was 6.9 points in favor of the summary by the instructor; a standard deviation of this difference is 3.66. It will have little statistical significance, however, since the chances of a reversal are about one in ten.

This study is subject to the following criticisms. First, the instructor may have varied his method unconsciously from day to day, as already indicated. Second, the content of the course was not the same for the two terms. This fact made it impossible to check all variables by the method of reversing the conditions for the two terms. Third, the Winter Term had only thirty-one class hours of instruction exclusive of holidays as compared with thirty-four for the Fall Term. This difference in the number of class hours between the two terms should not invalidate the results, be-

cause the comparisons are made between the groups reciting during the same term. Finally, the number of cases was not large enough in either term to warrant the drawing of definite conclusions.

In view of the criticisms given, it cannot be claimed that the results of this study have general applicability. However, the results do tend to show that it is immaterial whether the summary of the previous day's lesson is made by the instructor or by the students answering the instructor's questions about the work. The former method may have the advantage of presenting to the students a well-rounded and a well-connected summary of the salient points in the previous day's work while the latter may have the advantage of stimulating the students to mental activity. In this study the advantage of the one seems to have balanced itself against that of the other.

EDITORIALS

EDUCATION FOR A CHANGING CIVILIZATION

WHEN I read Professor Kilpatrick's book, whose title furnishes the caption for the few observations I am about to make, I was distinctly worried. It summarizes and intensifies the impression gained in conversation, magazine literature, and books that we have changed and are moving with accelerated motion toward greater change. The War, increase of crime, revolutions, flappers, hip flasks, movies, radio, airplanes, bobbed hair—these are all symptoms of change which are disturbing because on the whole it seems to be a change for the worse.

A month or so ago, however, Professor Horn started me on a new line of thought that has been increasingly comforting as I have pursued it. Horn says that of the five thousand most common words used in writing vocabulary, only sixteen new words have been added to the language in the last thirty-six years. To be sure, thousands of words have been invented during that time, but they are fringe words occasionally used and words which would not be included in spelling textbooks as fundamentals of the spelling vocabulary. Of the five thousand words which are now included in the average textbook on spelling, 4,984 are thirty-six years old. If a child had learned his five thousand words in 1891, the task of keeping up to date would have been limited to learning one new word every two years and three months. This does not seem to be a difficult task.

Consequently, I have been thinking about change in terms of fundamentals rather than in terms of totals. Perhaps the changes which we recognize lie less in these fundamentals to which we are confined in school curricula than in the marginal totals and situations which we face. I do not know the answer, but I have been comforted by considering this phase of the question.

Spelling is a mechanical subject, and therefore may not be important. Yet traits of character lie at the heart of education, and here Vieth recently found, in his study of Christian traits for the new international series, that the traits emphasized in the Bible need to be supplemented scarcely at all to bring the list up to date. This is significant in view of the fact that the Bible was written nineteen centuries and more ago.

Similarly in arithmetic, the fundamental operations of addition, subtraction, multiplication, and division, the mechanics of measuring time and space, percentage, mensuration, in fact all the fundamental processes are relatively old, and none has been added within our life time. In the fields of music and literature, few additions are made to the fundamental classics in any one generation. Perhaps in the field of social science the fundamentals are changing more rapidly. I do not know. Yet even here, the structure of the state is not rapidly changing, and the fundamental principles formulated a century ago still hold in the essentials.

From these and other excursions in the subject of change, I have emerged with the feeling that while change looms large in gross amount and in spectacular vividness, the index of change—the percentage of the total—of the fundamentals of the curriculum is not dangerously high. What change there is is important, since a little leaven leavens the whole lump. Since it is important, it must be faced, but there is no occasion for panic. Though much is discarded, much remains, and as in times past, so now in these disquieting times, the fundamentals of our civilization stand solidly as a base from which to push out with confidence toward new adventures.

W. W. C.

COOPERATIVE AND INDIVIDUAL RESEARCH

RESEARCH may be conducted individually or cooperatively. In the first instance, one person, or a small group of individuals in a single institution or school system sets up the problem, decides upon the method of investigation, and guards the results until they are issued in published form. In the second instance, a considerable number of persons representing different sections of the country and bringing varying viewpoints cooperate in exercising these functions.

It is likely that much of our fundamental research in education will continue to come from individual effort. The patient quest for knowledge by the lone investigator has brought results in the past and will in the future. The recognition of this fact should not blind us, however, to the benefits of cooperative research. The over-conservative attitude of some research workers frequently stands in the way of organizing studies of first-rate importance. There is some basis for their position. It is true that cooperative undertakings frequently encounter practical difficulties which render them fruitless, but it is doubtful if the mortality among cooperative projects is any higher than that among individual undertakings. This statement will be supported by those who have had experience in compiling lists of "research studies under way" and have later checked those listed against "studies completed."

Cooperative investigations like individual studies are successful if they are properly organized. These are the requirements for a successful cooperative project. First, a well-selected committee to define major issues in the field of investigation, to suggest methods of investigation, and to review findings previous to publication. Differing viewpoints should be represented by the committee personnel. People whose work in the past has earned them recognition and prestige should be on the committee. Those of the type so enamored with pet ideas that they no longer have open minds in the field of investigation should be excluded. Paradoxical as it may seem, such people are found among our best-known investigators. Second, provision must be made for a personnel to conduct the investigation sponsored by the committee—that is, for doing the work. This may be one person who gives full time to the work, or several persons, either committee members or others, who are in a position to give full time over a reasonable period of time. When several people are working, it is essential to the best result that one person with adequate time at his disposal for work and travel be available to coordinate the results of the several investigators. Third, there must be some provision for travel expense. The right kind of committee's action cannot be accomplished unless the give and take discussion and debate of the cooperators are capitalized. This is possible only when the committee is able to get together for two or three days at a time.

Provided with these essentials, group research bears fruit. It avoids some of the weaknesses which frequently characterize individual effort. The topics of investigation are likely to be well chosen, and bias in the interpretation of results is reduced. The best methods of investigation are likely to be employed. Most important of all, a group of people with prestige are familiar with the findings of the study which, therefore, is far more likely to get over into practice. It is at this point that many individual investigations fail. Every time one prepares a comprehensive bibliography he is struck by the number of significant researches already in existence which have received little or no attention as far as modified school practice is concerned.

The facilities for fruitful committee research are better each year. The opportunities offered by the National Society for the Study of Education are well known. The various committees of the National Education Association and the departments of this organization, such as those of the Superintendents, the Secondary School Principals and the Elementary School Principals, are developing techniques of group research which get results both in uncovering new knowledge and in effecting better practice. The Bureau of Education through such groups as the National Committee of Research in Secondary Education also offers opportunities for valuable cooperative work.

In short, there are signs to support the statement in a recent editorial in this JOURNAL that: "Further progress in the professional development of the field of education will be founded upon sound and far-reaching programs of cooperative research rather than the present policy of competitive research." Individual research will always have its place. It will create much of the raw material in the way of new knowledge upon which group research of broad scope must be founded. Cooperative and individual research are both necessary if either are to realize fully their possibilities in guiding us to better educational procedures.

JOHN K. NORTON

NEWS and COMMUNICATIONS

Phoenix, Arizona, reports a high school with an enrollment of twenty-eight hundred and a junior college with two hundred enrollment for the regular day sessions. Since Phoenix has a population of fifty thousand these figures look high. Are they? Who can report better?

The *Horace Mann Course of Study in Geography* for primary and intermediate grades and junior high school is now ready for distribution, according to an announcement from the Bureau of Publications, Teachers College, Columbia University. This volume is full of helpful suggestions and illustrations for teachers of professionalized subject-matter.

The World Federation of Education Associations will shortly go into the field to raise a fund of ten million dollars to put the work of the Federation on an enduring basis. This is an organization to further educational interests and to serve as a clearing-house for the best educational thought of the world. One of its chief objectives will be the removal of illiteracy. The Federation meets biennially, the last session meeting at Toronto, Canada, in August of 1927.

The Los Angeles Course of Study (Bulletin No. 12) furnishes to the principals and teachers of Grades V, VI, and VII materials and suggestions for use in special celebration of Benjamin Franklin's birthday. The materials are organized into a list of materials on Franklin to be used in appreciation activities; problem-solving activities in detail with appropriate materials suggested, descriptions of concrete activities, and a complete classified bibliography.

We recently received a little booklet entitled *The Spirit of Work*, written and compiled by the pupils of the English classes of the Junior High School of Hammond, Indiana, and printed by the high-school pupils of that city. The pamphlet includes a number of short compositions of an essay type and bibliographical character, with selected material from various well-known writers. This is but another one of the many types of motivated school work which Superintendent Caldwell has been fostering in the schools of that industrial city.

The *English Journal* is now appearing in two editions—a regular edition devoted to the work of the junior and senior high schools and a college edition to English in higher education. This is the first educational magazine to adopt such a policy.

This publication, which is the official organ of the National Council of Teachers of English, originally covered the four years of the traditional high school and the first year of college. With the growth of the junior high school, the unification of the English work through six years of secondary education, and the extension of the college field, one magazine was no longer considered adequate to cover the wide span of grades.

Superintendent W. J. O'Shea and District Superintendent John S. Roberts, of New York, have announced distinctly higher requirements for admittance to the city training schools for teachers which will be effective next September. The changes include additional required subjects, a higher rating in State Regents' examinations, and a suggested list of activities in one or more of which the students in the training schools may be expected to participate. This is that city's way of coping with the increase in the number of those applying for admittance to the training schools. It also recognizes the fact that children should be taught by the most competent of individuals available.

The Public School Publishing Company has recently announced the publication of a weekly record chart to measure schoolroom temperature. This has been devised by Dr. Wood and Miss Hendriksen, and is intended to emphasize the value of fresh air in the schoolroom by focusing attention on an hourly record of the temperature. It is intended to teach pupils to share the responsibility for one schoolroom condition which has a direct effect upon the health of the children.

Dr. T. D. Wood is too well-known to need any introduction to any audience. Miss Hendriksen is co-author with him in a textbook on *Ventilation and Health*.

An interesting bit of research by Miss Grace A. Kramer of the Baltimore Bureau of Research is reported in the December number of the *Baltimore Bulletin of Education*. Miss Kramer took fifty pupils out of each of the bright, average, and dull groups and checked their scores on arithmetic and reading before and after the summer vacation. While she recognizes that the study covers a comparatively small group, she states that it is somewhat definite in its failure to locate any marked tendency to forget. The children as a group proved fairly stable in their retention of arithmetic, and an appreciable improvement in reading ability was shown with more than 40 percent of the children.

Madison County, Ohio, has a unique organization of high-school students called "The Ninety Club." Students may become active members when they have ten credits with marks of 90 or above and no final grade in any subject below 80. Honorary members consist of those students who are Sophomores with three units, Juniors with six units, and Seniors with eight units having marks of 90 or above and no final mark below 80. Each year a banquet is held which active, honorary, and alumni members and teachers of the county may attend. The Club has placed a definite mark of approval on high

scholarship and makes for a splendid social spirit among the schools with none of the evils which sometimes accompany rivalry in contest work.

"Teach More Spanish in the Schools," is the title of a mimeographed bulletin which the National Foreign Trade Council recently distributed. "If business men are united on one suggestion for improving the language instruction in American schools with a view to bringing it more in line with the practical needs of the near future, it is to *teach more Spanish*," is the opening statement in the bulletin. Some impressive data are presented: the United States is now the first supplier of goods to every republic in Latin America except Paraguay and there is just one percent difference between the British trade with Paraguay and ours; practically one-fifth of our entire export trade finds its market in the countries between the Rio Grande and Cape Horn; our trade relations with Latin America have increased from 50 to 100 percent in the last two decades and the need for men who know the Spanish language is every year becoming greater; we sell to Spanish-speaking nations three times as much of our manufactures as we do to German-speaking nations and more than four times as much as to the French.

In the Eighty-fourth Annual Report of the Detroit Public Schools is a summary of a handwriting survey made during the past year. The summary is as follows:

There is a constant and healthy growth in the legibility of writing through the elementary schools. The quality attained holds very well through the intermediate and high schools. The quality of writing of Teachers College students is very high indeed, a fact which promises well for the incoming generation of teachers. The results on the formal handwriting test may be accepted as being representative of the kind of writing which is done by pupils in ordinary situations. Comparison of the results in several schools with the results of five years ago shows an increase in legibility with no loss in rate of writing.

Mr. A. Atwater Kent, manufacturer of radios, has written a letter to the Federal Radio Commission urging that a consideration be given to the use of the radio in education before all hours have been allotted for entertainment. He says in part:

I have felt for some time that the use of radio in education is not receiving the attention which it merits and which it should receive because of the opportunity it affords for the dissemination of knowledge. It seems to me that we should not permit the attractiveness and pleasures of entertainment-broadcasting to absorb us to the point of exclusion or neglect of education. Unless we organize a practical and systematic plan for educational broadcasting, it will not be long before all the hours are gone. Might it not be proper for the Federal Radio Commission to draw into conference some of the leading school and educational authorities of the country?

The December number of the *Detroit Educational Bulletin* contains the results of a brief study of fifth- and sixth-grade children in relation to the library. The test is of the selective-answer type and covers, among other things, children's conduct in the library toward others of their own group and

toward visitors, the purpose for which the child was in the library, and the books which he likes best. On this last point the results seem to indicate that boys and girls of nine years of age do not care for the same type of books. Half the boys prefer books dealing with lives of great men and the other half enjoy books about heroes, while 80 percent of the girls prefer fiction and 20 percent choose books about the outdoors. From the responses obtained, the conclusion is drawn that the elementary-school library is not only creating, through its pleasant environment and possession of the best books, a love for reading, but is also developing a love for the ideals of conduct.

THE EFFECT OF CRAMMING UPON RETENTION—IMMEDIATE AND DELAYED

The advisability of giving warning before tests very largely depends upon the effect which the cramming, usually resorted to under such circumstances, has upon retention. For the purpose of this study, cramming is defined as the intensive study motivated by warning of a test. Obviously, this intensive study may be for some the learning of new material, for others drill or review, and for still others a combination of the two. The interest of the research was purely practical, and therefore no effort was made to go beyond the general fact of intensive study as the result of warning.

On the basis of scores made on the Terman Group Intelligence Test, 408 high-school and junior-college students were paired so as to divide each class into an experimental and a control group. The mean intelligence test score for the 204 cases in the experimental group was 138.87; for the control group, 138.82.

Objective tests of one hundred items were constructed, each test covering the material studied in that particular class during the previous eight weeks. The reliability of these tests as computed by Brown's formula, $R = \frac{Nr}{1+(N-1)r}$, ranged from .86 to .93.

The control group was given the test as a complete surprise. The experimental group was warned to prepare for a test the following day, and after being given instruction respecting the recording of time spent in cramming, was dismissed. All possible precautions were taken to prevent the experimental group from gaining information respecting the nature of the test. Six weeks later the identical tests were given both groups as a complete surprise, no class reviews having been conducted in the interval.

The time spent in cramming varied both with individuals and with classes. Mean cramming time for the total experimental group was 86.3 minutes. The mean lead of experimental over control groups in the different classes ranged from 4.3 points to 23.0 points, with a mean lead for the total experimental group of 11.1 points. In the retest after the six weeks interval, the experimental group retained a mean lead of 6.3 points over the control group—over half the initial advantage due to cramming.

When the probable error of difference was determined by the formula

$$PE_{diff.} = \sqrt{(PE)^2 (PE_m)^2},$$

the difference between the mean scores of experimental and control groups in the separate classes was found to be statistically significant in every class with as many as fifteen paired cases, both for immediate and delayed retention. Even in classes where, due to a small number of cases, the differences were not statistically significant, there is still much weight in the fact that in no class did the experimental group fail to score a lead over the control group, both in the initial test and in the retest. Warning for tests thus seems to be a real economy in learning, both for immediate and delayed recall, at least within the limits of this experiment.

GLENN R. PEASE

John Fletcher College

The Division of Educational Research, of the Philadelphia public schools, has just issued a report on the Philadelphia English Test (Bulletin, No. 64). This voluntary test was given in September, 1927. Part I covered certain specific requirements laid down by the city's course of study in English for Grade IV-B and comprised a battery of five subtests so arranged as to yield separate scores. These items tested the pupil's knowledge of function, correct usage, sentence sense, subject, and predicate. Part II included subtests 1 and 2 of Part I and four additional subtests, namely, adjective, adverb, preposition, and conjunction. The purpose of the test was to establish clear-cut immediate aims of achievement in the light of the requirements laid down by the course of study. Part I of the test was administered to 17,519 pupils and Part II, to 11,128. One of the interesting results found relates to subtest No. 1 dealing with function. In this subtest it was found that the progress of pupils throughout the V-A term was nearly as great as that obtained in the four succeeding terms.

Practice Teaching: A Suggestive Guide for Student Teachers contains a series of lesson plans which was prepared by a subcommittee of the Committee on Teacher Training of the International Kindergarten Union. The material contained in this booklet was submitted to various sorts of criticism before it took its final form. The series of lessons is so arranged that the student is introduced to the various phases of the training before her by the observation of teaching and participation in the presentation of the lesson, which may involve direct or indirect contact with the pupils, as well as by practice teaching. The various activities included in the programs of the kindergarten and primary grades are considered in turn. Questions which may serve as guides to the observation period are suggested first, a list of references is given, and ways of participating are followed by suggestions for the planning of the lesson which the student herself is to teach. The scheme seems excellent: the problems involved in the lesson to be observed are suggested, the student next may learn what various writers have said about the group of activities, then she finds ways of sharing in the work, and finally attempts a lesson of this sort herself.

REVIEWS

STARCH, DANIEL. *Educational Psychology.* (Rev. Ed.) New York, Macmillan Company, 1927. ix + 568 pp.

This edition of Starch's book contains approximately one hundred pages more than the original edition comprised. The bulk of the additional space is devoted to analyzing significant research material that has been made available since 1918. One entirely new chapter has been written, covering briefly the movement for mental hygiene and emphasizing some of its practical principles that should operate in the schoolroom. Twelve of the twenty-one original chapters remain substantially unchanged. Numerous paragraph headings have been added throughout the book, and the bibliography at the end has been expanded by more than one hundred fifty new titles.

LAWRENCE AUGUSTUS AVERILL
State Normal School, Worcester, Massachusetts

JUDD, CHARLES HUBBARD. *Psychology of Secondary Education.* Boston, Ginn and Company, 1927. xiv + 545 pp.

According to the author, this book is intended as a substitute for the author's *Psychology of High School Subjects,* which appeared in 1915 as a text to "provide materials of instruction in courses organized to give professional training to high-school teachers." The book purports to give "an analysis of the mental process which pupils exhibit in studying particular high-school subjects" and contains an admixture of data collected, the author says, from student reports and from experimental studies of education made in the high-school field.

Many readers will be much at sea with regard to the basis for the selection of the material included in the book and the goal towards which the author is moving. The entire treatment certainly leaves the impression that it was written to meet a "growing general demand for material of instruction in courses organized to give professional training to prospective high-school teachers" who are now regularly required to take from fifteen to twenty hours of work in education in order to qualify for teaching in the high schools of the country.

Aside from the omnivorous and seemingly planless treatment of material and the fact that some inaccuracies exist and that teachers are sometimes referred to archaic references on important topics, the text has some distinct merits. The author's chapter on pupils' difficulties in mathematics is very hopeful. It should aid any teacher of that subject who is trying to direct his learners in a way that will help them avoid or overcome the many difficulties

or tendencies to error which the learners of this and other high-school subjects quite naturally encounter in their efforts to master the work. The author also does the high-school teacher a distinct service in calling attention to the psychology of mental development and in discussing a number of concrete educational problems according to the fundamental mental and emotional changes which are taking place at the high-school stage of development.

The author ends where the reviewer should like to have seen him begin—with a discussion of methods of study and of concrete suggestions on supervising high-school students in a way that would enable them to acquire truly efficient methods of thinking and working while they are mastering the various subjects in the curriculum. This is now generally recognized to be one of the important problems in the teacher-training field. It will be a source of regret to many that a book which aims to be a text for secondary teachers does not give more help on this and similar problems, instead of attempting to cover the entire secondary field in the generalized way followed by this professional text.

WILLIAM F. BOOK

Indiana University

DAVIS, CALVIN OLIN. *Our Evolving High School Curriculum.* New York, World Book Company, 1927. ix + 301 pp.

Any book dealing with the secondary-school curriculum appearing within the next few years will have to undergo comparison with Professor Uhl's scholarly work. Thus compared, Professor Davis' book is somewhat sketchy. The title is suggestive, but its possibilities are not exploited by revealing the intimate connection between our social, economic, and political growth and the evolving high-school curriculum.

The book may be divided into three parts. The first consists of an historical background; the second of a discussion of aims, objectives, and values and their relation to curriculum construction; and the third of concrete illustrations of high-school curricula and statistical data regarding secondary-school offerings.

The historical material is rather meagerly and summarily presented. To one unfamiliar with the history of secondary education (and the book is evidently intended for students) it is confusing in its brevity. The five chapters constituting the second division of the book are poorly organized and the discussion of one chapter frequently runs into that of another in such a way that a student can hardly avoid unnecessary confusion. On the other hand, the last two chapters, which we have called the third division constitute a genuine contribution to the literature on the secondary-school curriculum. We say this even though chapter X is largely a restatement of material previously published by Professor Davis under other auspices. These data, taken in connection with the large number of programs of studies which he introduces for

illustrative purposes in chapter IX, affords the student an abundance of reference material dealing with present-day practice.

V. T. THAYER

Ohio State University

CHARTERS, W. W. *The Teaching of Ideals.* New York, Macmillan Company, 1927. xiii + 372 pp.

This book will undoubtedly appeal to many teachers. Its central purpose is to put the teaching of ideals on a scientific basis. And what do most teachers want more than to arouse enthusiasm for ideals and to be "scientific"? It is conceivable that morality, correctly conceived, is more closely related to art than to science, but most teachers are innocent of such heresy. The thought will not occur to them, for the author is right in his claim that "The pedagogical mind abhors unsystematized material." He is right also in contending that up to the present time moral education in the schools has lacked this quality. So it follows that he is still right when he concludes that the teaching of ideals will never "achieve respect among teachers until it has been appropriately systematized." Perhaps it may not be worth respecting when it has been systematized, but that is another story. Teachers can be trusted not to allow themselves to be weaned from being "scientific" by such irrelevant considerations.

Those interested in the attempted application of scientific technique to the teaching of ideals in our schools will find in this book a chapter of neat definitions of such words as ideals, attitudes, traits, standards, and purposes. They will find well-documented discussions of the selection of ideals and situations in which they function, the measurement of moral attainments, comparisons of theories of moral instruction, and other germane topics. Occasionally they may wish for a more adequate, perhaps richer, treatment of problems, but they will have nothing to complain of in the matter of clearness of style and practicalness of intention. If they faithfully put the doctrine of the book to work, they will doubtless be rewarded with evidence of success.

For myself I don't like the book at all. The author shows no appreciation of the failure we adults have made of our world and are at this moment intent upon making of it. What intrigues him is the development of a method which will more certainly and more efficiently perpetrate the generally accepted folk-ways. In this he is the typical schoolman, and this standpoint is, in my judgment, so deplorable that no surface excellences can make any impression. "The reader," says Mr. Judd in the editorial introduction, "who secures a proper understanding of the purposes of the book will be led to undertake the extension of the plans here outlined." One reader, at least, will do nothing of the sort.

M. C. OTTO

University of Wisconsin

DEMIASHKEVICH, MICHAEL J. *The Activity School.* New York, A. G. Seiler, 1926. 150 pp.

The New-Education Movement has made much more progress in Europe than in America largely because of the wider opportunities for educational reconstruction in the countries whose geographical and political characteristics were materially changed in 1919. A critical examination of the philosophy of the Activity School is presented by Dr. Demiashkevich in this book under review.

The emphasis on the value of manual activity made by the activists is examined from the angles of disciplinary value, utility as a means of training the young to meet the demands of present-day society, and the vehicle by which "a better future for human kind" may be built up. The author presents the arguments for intellectualism as preferable to manualism.

Potent criticisms of the formula "learning by doing" are made, particularly the alleged over-importance attached to self-activity by the activists. Dr. Demiashkevich pertinently points out the value of "experience" as an intellectual activity, making an interpretation practically synonymous with that of Dewey. The thesis that the child is naturally good and hence should be let alone; that his freedom and spontaneity constitute holy ground upon which the teacher dare not tread; that the *élan vital* or inner drive is the best way of learning a thing; that the principle of cooperation should supplant the principle of competition together with all the mechanics, such as grades, marks, and programs, that go with the latter principle; that the teacher should carry on the function of self-effacement, are quite wholesomely analyzed and their limitations definitely indicated.

This study provides a much-needed warning to the activists against the wholesale abolishment of those features in modern education which have proved their worth, that is, a degree of intellectualism, books as repositories of culture, teachers as inspirers and directors, and psychologized subject-matter. As a remonstrance against the Prussian disciplinary system of the nineteenth century, the Activity School is lauded, but as a philosophy and practice tending to an extreme individualism which soon becomes license, the author utters words of timely caution. At times the effectiveness of the analyses and criticisms is somewhat discontinuous because of the author's too numerous literary and philosophical allusions and digressions.

F. C. WOOTON

Stanford University

MONROE, WALTER S. *Directing Learning in the High School.* Garden City, New York, Doubleday, Page and Company, 1927. x + 577 pp.

This book, composed of seventeen chapters, their number and size being admirably adapted to the typical three-hour semester course in undergraduate schools of education, is one of a series of three texts in the field of education. The text as a whole is well edited. The chapter titles are inclusive and richly

significant, as are the contents of each chapter; the bibliography is unorganized and contained for the most part in footnote citations. The indices are brief and well made.

The keynote of the text, as compared with other treatments of the field, is sounded in the second chapter devoted to "learning exercises." The thesis of this chapter is "that much of the learning activity in which high-school students engage will be in response to exercises assigned by the teacher" (p. 23). The succeeding chapters are entirely consistent with this position, which the present reviewer feels to be incontestably sound.

The importance of this emphasis upon the systematic planning of learning exercises should be apparent to any student. Such planning may properly be regarded as the major responsibility of high-school teachers. The planning of learning exercises provides the most tangible point of contact with the learning process. Such exercises need to be planned most wisely and in detail with regard for the desired outcomes of the course or unit, and the qualifications of individual pupils. The quoted paragraph gives an excellent statement of a philosophy of teaching, and summarizes the organizing principle of the text:

"The three concepts, learning exercises, learning activities, and abilities, are connected. Learning exercises form the basis of the mental activity. In psychological language they furnish the stimulus, and the activity is the response. The abilities are the outcomes or products of the activity. This relationship furnishes a basis for predicting either the abilities that will result from the doing of certain learning exercises, or the learning exercises that should be assigned in order that students may acquire the abilities specified as objectives." (p. 26)

Considering the amount of attention given to learning exercises, it is to be regretted that the discussion is conducted at such long range. The prospective teacher receives no more specific direction as to how to construct such exercises than is supplied by a list of ten general criteria (p. 46 ff.), various other criteria and lists of principles applicable to exercises of different types (Chapters V to X), and brief incidental illustrations. It may be contended, of course, that practice in the construction of exercises should be delegated to training courses in methods of teaching the particular subjects. However, when so many pages are devoted to general discussion of factors that enter into the construction of effective exercises, the teacher should welcome a series of explicit directions applicable to typical exercises in each of the major high-school subjects, together with specimen exercises of each type. If well presented in the teacher-training class, the reading is likely to acquaint the student with the elements of which good exercises consist. It appears highly doubtful, however, whether more than a few superior undergraduates have sufficient professional background to assimilate so many theoretical considerations in one course. Such assimilation is not easy even for teachers of considerable experience, and it may or may not improve the teacher's ability to construct and direct exercises effectively.

Inasmuch as the author takes pains to state his positions as exemplified in the text regarding certain problems in the construction of teacher-training

curricula, it is helpful to consider these positions as a means of evaluating the text as a whole. Three such implications of the text may suffice; first, that the course in general methods for prospective high-school teachers should consist largely of codified principles; second, that such principles can be selected arbitrarily by a single expert; and, third, that the sequence and coherence of such principles is a factor of primary importance in curriculum construction.

From the standpoint of the reviewer, each of these positions is open to serious question. It is doubtless too soon to state that they are untenable, since experimental evidence regarding the organization of university training courses is meager. Evidence from experimental courses in teachers colleges and normal schools, however, would indicate that the course in methods consisting of an encyclopedic compilation of principles is more likely to bewilder the prospective teacher than to equip him for the intelligent performance of his duties. There is good reason to suppose that whatever theoretical principles are taught should be closely related to specific problems or duties with which the prospective teacher is familiar. Such important duties and problems as are not familiar to the prospective teacher should be systematically taught as part of the content of the course. Only painstaking analysis, by a systematic if not by an objective technique, of the duties involved in typical school positions can determine the criteria whereby such principles may be wisely selected for undergraduate students. By the same token, the coherence of such principles is of less moment than their functional value in teaching. The best data available concerning the questions that prospective or beginning teachers actually ask would seem to be more appropriate content for the undergraduate course. Whether such data submit to logical formulation as coherent principles or not, is a minor consideration.

This criticism is mainly directed at the conceptions underlying the organization of the text as an undergraduate course. The actual content material is commendable in almost all respects. As a compendium of research findings from which the advanced student may select what is pertinent, the volume probably excels any other in the selection and evaluation of objective evidence concerning teaching procedures. As a well organized reference manual on high-school teaching, the text has the great advantage of subordinating any one type of system or method to the fair perspective of significant issues which the objective data present.

DOUGLAS WAPLES

University of Chicago

PUBLICATIONS RECEIVED, NOVEMBER 15 TO DECEMBER 15

BOOKS FOR EDUCATIONAL EXECUTIVES

Bender, J. F. *The functions of courts in enforcing school attendance laws.* New York, Teachers College, Columbia Univ., 1927. 187 pp. (Contributions to education, no. 262) Cloth, $1.50. Paper, $1.25.

Brooks, E. C., and others. *Report of the Commission on length of elementary education.* Chicago, Ill., Univ. of Chicago, 1927. 167 pp. (Supplementary educational monographs, no. 34) $1.25.

Carr, J. W. *Factors affecting distribution of trained teachers among rural white elementary schools of North Carolina.* New York, Teachers College, Columbia Univ., 1927. 91 pp. (Contributions to education, no. 269) Cloth, $1.50. Paper, $1.25.

Chapman, H. B. *Organized research in education, with special reference to the Bureau of educational research.* Columbus, Ohio, Ohio State Univ. Press, 1927. 221 pp. (Bureau of educational research monographs, no. 7) $1.50.

The classification of pupils in private schools. Philadelphia, Private School Teachers' Assn., 1927. 24 pp. (Pamphlet no. 2) $.25.

Columbia University. Teachers College. Institute of Educational Research. Division of Field Studies. *Report of the survey of the schools of Duval County, Florida, including the city of Jacksonville.* New York, Teachers College, Columbia Univ., 1927. 433 pp. $1.50.

Craig, G. S. *Certain techniques used in developing a course of study in science for the Horace Mann elementary school.* New York, Teachers College, Columbia Univ., 1927. 73 pp. (Contributions to education, no. 276) Cloth, $1.50. Paper, $1.25.

Fisher, D. C. *Why stop learning?* New York, Harcourt, Brace, 1927. 301 pp. $2.00.

Glueck, E. T. *The community use of schools.* Baltimore, Williams & Wilkins, 1927. 222 pp. $3.00.

Hamtramck, Mich. Board of Education. *The public school code of the Hamtramck, Michigan, public schools.* Hamtramck, Mich., The Author, 1927. 260 pp. $1.50.

Hockett, R. M. *Visitors in an experimental school.* New York, Teachers College, Columbia Univ., 1927. 102 pp. $1.00.

Rogers, F. R. *Tests and measurement programs in the redirection of physical education.* New York, Teachers College, Columbia Univ., 1927. 166 pp. $1.75.

Tallman, R. W. *A critical analysis of student persistence at the State University of Iowa.* Iowa City, Ia., State Univ. of Iowa, 1927. 64 pp. (Studies in education. Vol. 4, no. 1) $.75.

Watson, G. B. *Experimentation and measurement in religious education.* New York, Association Press, 1927. 295 pp. $3.75.

BOOKS FOR PSYCHOLOGISTS

Babcock, M. E. *Applications of clinical psychology in Hawaii.* Honolulu, Hawaii, Univ. of Hawaii, 1927. 82 pp. (Research publications, no. 1) $.25.

Phillips, D. E. *An elementary psychology; suggestions for the interpretation of human life and conduct.* Boston, Ginn, 1927. 420 pp. $1.72.

Stoke, S. M. *Occupational groups and child development; a study of the mental and physical growth of children in relation to occupational grouping of parents.* Cambridge, Mass., Harvard Univ. Press, 1927. 92 pp. (Harvard monographs in education, no. 8) $1.00.

Tonks, H. L. *Psychological foundations of teaching.* New York, Globe Bk. Co., 1927. 212 pp. $1.67.

BOOKS FOR TEACHERS AND SUPERVISORS

Adams, John. *Errors in school; their causes and treatment.* Boston, Houghton Mifflin, n. d. 325 pp. $2.50.

Alberty, H. B. *A study of the project method in education.* Columbus, Ohio, Ohio State Univ. Press, 1927. 111 pp. (Contributions in principles of education, no. 2)

Booth, M. J. comp. *Material on geography; including commercial products, industries, transportation and educational exhibits which may be obtained free or at small cost.* 4th rev. ed. Charleston, Ill., The Compiler, 1927. 101 pp. $.50.

Coryell, N. G. *An evaluation of extensive and intensive teaching of literature; a year's experiment in the eleventh grade.* New York, Teachers College, Columbia Univ., 1927. 201 pp. (Contributions to education, no. 275) Cloth, $1.50. Paper, $1.25.

Dixon, Loris, and Browning, B. R. *Cardboard modelling.* New York, Pitman, 1927. Vol. 1, History and geography. 201 pp. $1.50.

Dolch, E. W. *Reading and word meanings.* Boston, Ginn, 1927. 129 pp. $1.36.

Kirby, C. V. *The business of teaching and supervising the arts.* Chicago, Abbott Educational Co., 1927. 73 pp. $1.00.

Lincoln, E. A. Beginnings in educational measurement. 2d. ed. rev. Philadelphia, Lippincott, 1927. 159 pp. $1.60.

Osborn, H. F. *Creative education in school, college, university, and museum.* New York, Scribners, 1927. 360 pp. $2.50.

Snedden, David. *Foundations of curricula; sociological analyses.* New York, Teachers College, Columbia Univ., 1927. 196 pp. $2.00.

Taylor, H. H. *A plan of printing instruction for public schools.* New York, John Day Co., 1927. 36 pp. $2.00.

Welling, J. B. *More color for you; color study developed by the experimental method.* Chicago, Abbott Educational Co., 1927. 87 pp. $1.00.

BOOKS FOR HIGH-SCHOOL STUDENTS

Álvarez Quintero, Serafín, and Álvarez Quintero, Joaquín. *La reja; comedia en un acto.* Ed. by C. B. Bourland. Chicago, Sanborn, 1927. 96 pp. $.84.

Balzac, Honoré de. *Le curé de Tours.* Ed. by J. H. Floyd. Chicago, Sanborn, 1927. 234 pp. $1.08.

Becker, M. L. *Adventures in reading.* New York, Stokes, 1927. 248 pp. $2.00.

Book, W. F. *How to succeed in college.* Baltimore, Warwick & York, 1927. 192 pp. $1.60.

Campbell, Macy. *Rural life at the crossroads.* Boston, Ginn, 1927. 482 pp. $1.96.

Eaton, J. J., and Free, A. V. *Machine shop science.* Peoria, Ill., Manual Arts Press, 1926. 181 pp. $1.48.

Gordon, N. E. *Introductory chemistry.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. 608 pp. $2.20.

Harrington, H. F., and Harrington, Evaline. *The newspaper club; a natural approach to composition in the schools.* Boston, Heath, 1927. 366 pp. $1.68.

Hawkes, H. E. *College—what's the use?* Garden City, N. Y., Doubleday, Page, 1927. 143 pp. $2.00.

Hunter, G. W. *New laboratory problems in civic biology.* New York, American Bk. Co., 1927. 286 pp. $.96.

Jeffery, J. F., and Cotter, H. L. *Machine shop projects.* Peoria, Ill., Manual Arts Press, 1927. 64 pp. $.56.

McKinley, A. E., and others. *World history in the making.* New York, American Bk. Co., 1927. 742 pp. $1.92.

McKinley, A. E., and others. *World history today.* New York, American Bk. Co., 1927. 859 pp. $1.92.

Macklin, Theodore, and others. *Making the most of agriculture.* Boston, Ginn, 1927. 542 pp. $1.88.

Marquina, Eduardo. *La Morisca, drama lírico.* Ed. by Ruth Lansing and Milagros de Alda. Philadelphia, Winston, 1927. 74 pp. $.60.

Moyer, F. E. *Important events of the past five years in European and American history.* New York, Self-Test Pub. Co., 1927. 64 pp. $.35.

Needham, J. G., and Needham, P. R. *A guide to the study of fresh-water biology; with special reference to aquatic insects and other invertebrate animals.* New York, American Viewpoint Soc., 1927. 88 pp. $1.00.

Palmateer, T. J. *Machine work; a shop manual and reference book.* Stanford University, Calif., Stanford Univ. Press, 1927. 202 pp. $2.25.

Polk, R. W. *Essentials of linoleum-block printing.* Peoria, Ill., Manual Arts Press, 1927. 60 pp. $2.00.

Sargent, F. L. *A working system of color for students of art and nature.* New York, Holt, 1927. 97 pp. $4.00.

BOOKS FOR JUNIOR HIGH-SCHOOL STUDENTS

Driggs, H. R. *Living English for junior high schools.* Lincoln, Nebr., University Pub. Co., 1927. Third book. 413 pp. $1.20.

Haworth, P. L., and Garner, A. W. *Our country's history.* Indianapolis, Bobbs-Merrill, 1926. 672 pp. $1.56.

BOOKS FOR ELEMENTARY-SCHOOL STUDENTS

Arnett, A. W. *The brother bears and other stories.* Chicago, Beckley-Cardy, 1927. 125 pp. $.70.

Bailey, C. S. *Untold history stories.* Dansville, N. Y., F. A. Owen Pub. Co., 1927. 192 pp. $.80.

Barrows, W. M. *Science of animal life.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. 389 pp. $1.75.

Brininstool, E. A. *Fighting Red Cloud's warriors.* Columbus, Ohio, Hunter-Trader-Trapper Co., 1926. 241 pp. $1.00.

Brininstool, E. A. *A trooper with Custer; and other historic incidents of the battle of the Little Big Horn.* Columbus, Ohio, Hunter-Trader-Trapper Co., 1926. 214 pp. $1.00.

Bryce, C. T., and others. *Newson readers.* New York, Newson & Co., 1927. Book 3, Storyland. 288 pp. $.88.

Buckingham, B. R., and Osburn, W. J. *The Buckingham-Osburn searchlight arithmetics.* Boston, Ginn, 1927. Workbook for grade III to accompany Book 1. 102 pp. $.36.

Coffman, Ramon. *The story of America.* Dansville, N. Y., F. A. Owen Pub. Co., 1927. Book 2, New world settlement. 127 pp. $.72.

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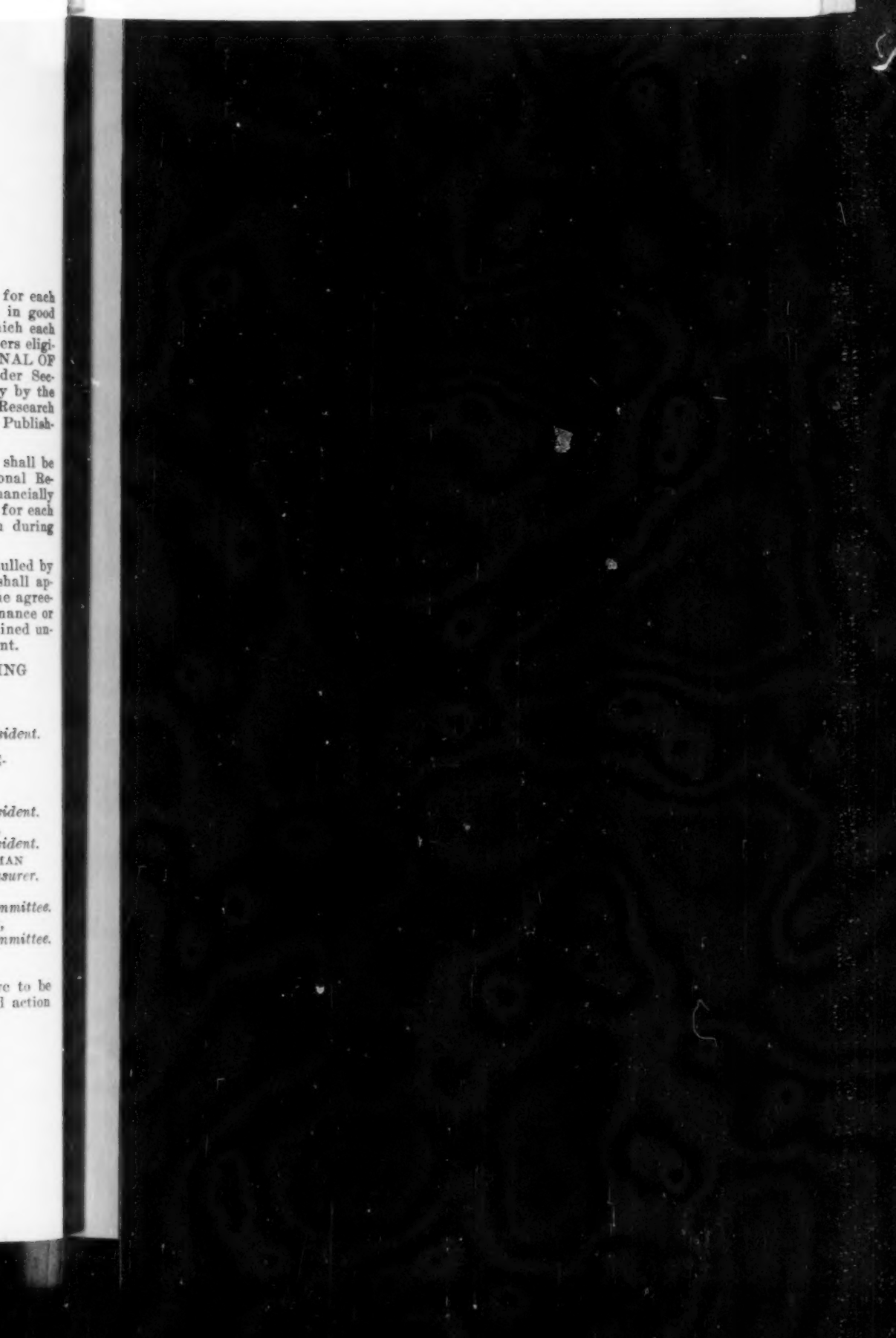
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